KoolChart for HTML5

USER'S GUIDE

Version 2.5

RiaMore Soft

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1. Overview

1.1. About KoolChart for HTML5

KoolChart for HTML5 is a comprehensive charting solution that allows you to add visualization features into your applications. It is a pure JavaScript (HTML5 Canvas) solution and you do not have to install any plugin. KoolChart for HTML5 is platform independent and a non-browser specific World Wide Web solution. As it provides you with more than 30 types of 2D/3D charts and gauges, you can experience a higher level of user interface from KoolChart for HTML5. Please visit our website at http://www.koolchart.com and click Demo, you will see a decent user interface and the highly interactive charting solution.

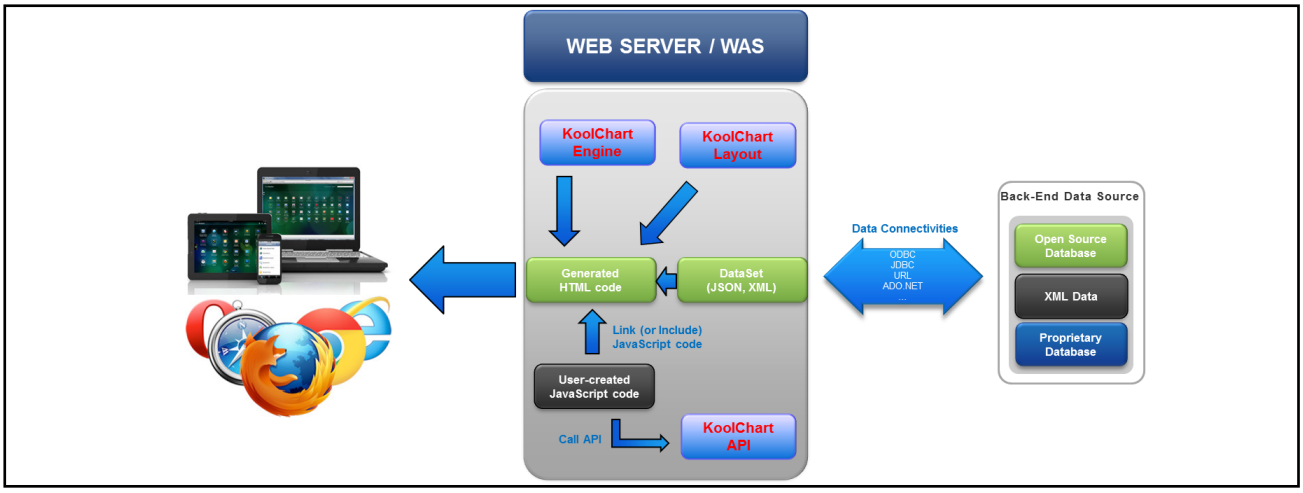
1.2. System Requirements

- Server -- No restrictions.
- Client -- HTML5 Canvas supported browsers.

IE	Firefox	Safari	Chrome	iPhone	Android
9.0+	3.0+	3.0+	3.0+	1.0+	1.0+

For IE 7 or 8, ExplorerCanvas (excanvas.js, which is packaged in KoolChart for HTML5) can be used to bring the feature which supports the HTML5 canvas tag to Internet Explorer but it could degrade the performance of chart renderings and the print function doesn't work properly in IE7 and IE8. Depending on which browser (or version) is used, the feature and the shape of chart elements rendered in charts can be different.

1.3. KoolChart System Configuration



<Figure 1 Data Transmission between Server and Client>

To create a chart using KoolChart for HTML5, the layout and the dataset should be prepared. The layout has detailed information, which determines the appearances and animations of charts such as colors, axis style, labels and animation effects etc. The format of the layout is XML. Please refer to <5. Using Layouts> for further information.
KoolChart for HTML5 supports the XML-formatted data and the Array-formatted data for the dataset. You can choose whichever fits your programming environment. Please refer to <3. KoolChart Data Formats> for further information.

1.4. KoolChart System Components

The installation CD of KoolChart for HTML5 has the following directories.

1. KoolChart
   This directory has minimum files required for running KoolChart. JavaScript files are in JS directory and image and CSS files are in Assets directory. You can easily set up KoolChart on your web server by copying KoolChart directory to the server. You need to include the JavaScript file which is under JS directory in your HTML file (or any server side script such as ASP, PHP, etc).

2. LicenseKey
   This directory has the license file (KoolChartLicense.js) for KoolChart.

3. Docs
   Two documents (User Manual and API reference guide) are in the Docs directory. The API reference guide is in the api directory. To view the API reference guide, open index.html file with your web browser.

4. Samples
   This directory has the HTML and XML files for sample charts.

1.5. Supported Chart Types

The JavaScript component of KoolChart is separated in 9 JavaScript files. (KoolIntegration.js is the integrated JavaScript version of KoolChart component. It can render all types of charts provided by KoolChart.) The following table shows the JavaScript file name and the corresponding chart types that can be created by the JacaScript file. Please refer to <5. Using Layouts> for further information.

JavaScript File Name	Chart Types
KoolChart.js	Basic Charts – Column, Bar, Pie, Line, Area, etc
KoolRadarChart.js	Radar Chart
KoolHistoryChart.js	History Chart
KoolRealtimeChart.js	Real-Time Chart
KoolScrollChart.js	Scroll Chart
KoolMatrixChart.js	Matrix Chart
KoolImageChart.js	Image Chart
KoolRealtimePremium.js	Real-Time Premium Chart
KoolGaugeChart.js	Gauge Chart
KoolIntegration.js	All Charts

2. Creating Charts

2.1. Registering KoolChart License Keys

Once you have obtained the appropriate license keys, you should register them before you use KoolChart for HTML5.
The license file is in the following path of the product CD.

- /LicenseKey/KoolChartLicense.js

All you have to do for applying the license key is to include KoolChartLicense.js in the head of your HTML document (between the <head> and </head> tags).

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>

<!--Registering the license keys for KoolChart -->
<script src="KoolChartLicense.js" type="text/javascript" language="javascript"></script>
                                                                    ...
                                                                    ...
                                                                    ...
```

< Example 1 Registering the License Keys for KoolChart >

2.2. Creating a Basic Chart

The following example shows how you can create a 3D column chart with a single dataset using the provided samples.
Copy the following directories to your working directory.

- KoolChart JS library: KoolChart/JS/KoolChart.js
- License file: LicenseKey/KoolChartLicense.js
- Sample HTML file: Samples/Column_3D.html

  * The license file should be included in your HTML file to render KoolChart.

Column_3D.html is as follows:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<meta http-equiv="Content-Script-Type" content="text/javascript" />
<meta http-equiv="Content-Style-Type" content="text/css" />
<meta http-equiv="X-UA-Compatible" content="IE=edge" />


<link rel="stylesheet" type="text/css" href="./KoolChartSample.css" />

<!--  If you want to support IE 7/8, you'll need the conditional excanvas include. -->
<!--[if IE]><script language="javascript" type="text/javascript" src="../KoolChart/JS/excanvas.js
"></script><![endif]-->

<!-- To include the license key. -->
<script language="javascript" type="text/javascript" src="../LicenseKey/KoolChartLicense.js"></script>

<!-- To include KoolChart JS library -->
<script language="javascript" type="text/javascript" src="../KoolChart/JS/KoolChart.js"></script>

<!-- sampleHelper.js is for samples. Don't include in your application. -->
<script language="javascript" type="text/javascript" src="./sampleHelper.js"></script>


<script type="text/javascript">

// ---------------------- Here we start creating a 3D column chart. ----------------------

//Setting the name of the function which is called when KoolChart is ready to be created. <4.1 Setting
chartVars>
var chartVars = "KoolOnLoadCallFunction=chartReadyHandler";

//Creating a chart.
//Parameters:
//1. Chart ID (You can use any name you like.)
//2. The DIV ID in which the chart is located (The parent DIV ID of the chart.)
```

```
//3. chartVars: The environment variables which are used when the chart is created.
//4. The width of the chart (If it is omitted, the value will be 100%)
//5. The height of the chart (If it is omitted, the value will be 100%)
KoolChart.create("chart1", "chartHolder", chartVars, "100%", "100%");

//The function which is set to the value of the KoolOnLoadCallFunction property.
//This function is called to set the layout and the dataset when KoolChart is ready to be created.
//Parameters:
//ID: The ID, which is used as a parameter in the function, KoolChart.create().
function chartReadyHandler(id) {
        document.getElementById(id).setLayout(layoutStr);
        document.getElementById(id).setData(chartData);
}

//Setting the layout using the XML-formatted string. <5. Using Layouts>
var layoutStr =
'<KoolChart backgroundColor="0xFFFFFF"   cornerRadius="12" borderStyle="solid">'
+'      <Options>'
+'              <Caption text="Anual Report"/>'
+'      </Options>'
+'      <NumberFormatter id="numFmt" precision="0"/>'
+'      <Column3DChart showDataTips="true">'
+'              <horizontalAxis>'
+'                      <CategoryAxis categoryField="Month" />'
+'              </horizontalAxis>'
+'              <series>'
+'                      <Column3DSeries labelPosition="inside" yField="Profit"
displayName="Profit">'
+'                              <showDataEffect>'
+'                                      <SeriesInterpolate/>'
+'                              </showDataEffect>'
+'                      </Column3DSeries>'
+'              </series>'
+'      </Column3DChart>'
+'</KoolChart>';

// Setting the dataset using using JSON format <3.2 Array - Creating an Array Data>
var chartData = [ {"Month":"Jan", "Profit":10000},
                  {"Month":"Feb", "Profit":15000},
                  {"Month":"Mar", "Profit":12000},
```

```
                    {"Month":"Apr", "Profit":30200},
                    {"Month":"May", "Profit":28000},
                    {"Month":"Jun", "Profit":12000},
                    {"Month":"Jul", "Profit":22000},
                    {"Month":"Aug", "Profit":13000},
                    {"Month":"Sep", "Profit":22000},
                    {"Month":"Oct", "Profit":29000},
                    {"Month":"Nov", "Profit":18000},
                    {"Month":"Dec", "Profit":30000} ];

// ----------------------- The end of the configuration for creating a chart. -----------------------
</script>
</head>
<body>

<div class="container">

        <div class="header">
                <p>KoolChart – Column3D Chart</p>
        </div>

        <div class="desc">
                Column3D Chart
                <button onclick="viewSrc()" style="font:11px Arial">View Layout & Data</button>
        </div>
        <div class="content">
                <!-- The parent DIV of the chart. -->
                <div id="chartHolder" style="width:600px; height:400px;">
                </div>
        </div>
</div>
</body>
</html>
```

<Example 2 Creating a Chart to an HTML Document >

The following list contains more detailed descriptions of the sample HTML document.

1. Set the doctype of your HTML file. (You can use other doctype)

```
<!DOCTYPE html PUBLIC "-//W3C//DTD
XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-
transitional.dtd">
```

2. Include KoolChart.js and KoolChartLicense.js.

```
<script language="javascript" type="text/javascript"
src="../LicenseKey/KoolChartLicense.js"></script>
<script language="javascript" type="text/javascript" src="../KoolChart/JS/KoolChart.js"></script>
```

3. Include the KoolChart CSS file (KoolChart.css) to create Preloader, Legend, Scroll chart or History chart.

```
<link rel="stylesheet" type="text/css" href="../KoolChart/Assets/KoolChart.css"/>
```

4. Create the parent DIV of the chart in which the chart is created.

```
<div id="chartHolder" style="width:600px; height:400px;"></div>
```

5. Create the layout and the dataset.

6. Call the KoolChart.create() function.

```
KoolChart.create("chart1", "chartHolder", chartVars, "100%", "100%");
```

7. If you want the chart you have created to be shown in IE 7 or 8, include excanvas.js. IE 7 and 8 does not support HTML5 but excanvas.js makes those browsers emulate HTML5. (You should keep in mind that in the performace perspective, IE 7 or 8 with excanvas.js is much worse than HTML5 supported browsers.)

```
<!--[if IE]><script language="javascript" type="text/javascript"
src="../KoolChart/JS/excanvas.js"></script><![endif]-->
```

Please refer to http://excanvas.sourceforge.net for excanvas.js

2.3. Viewing KoolChart Versions

You should know the version of KoolChart to request technical support and version update service. In order to find the KoolChart version you are using you can check the installation CD or you can check the KoolChart version of your web page as follows:

As you need to use the KoolChart.create() function to create the chart, you can also read the value of KoolChart.version in your JavaScript. To identify the version information, you can type KoolChart.version in the console or alert dialog.

```
alert(KoolChart.version);
```

3. KoolChart Data Formats

KoolChart for HTML5 supports two types of data format, XML and Array. This chapter describes how you transform your original data into KoolChart-supported data format.

3.1. XML – Creating an XML Data

When you use the XML format for your dataset be sure the rule that you should begin with the <item> tag and end with the </item> tag for each data. KoolChart displays as many items in the chart as the number of <item> tags. If no <item> in the XML data, KoolChart displays nothing in the chart.

The single dataset (single series) is used when you have one numeric data and the multiple datasets (multiple series) are used when you have more than two numeric data.
The following example is for a monthly report for revenue, cost and profit (3 numeric data), which needs to use multiple datasets.

Month	Revenue	Cost	Profit
Jan.	10,000	5,000	5,000
Feb.	15,000	7,000	8,000
Mar.	12,000	6,000	6,000
Apr.	30,200	4,000	26,200
May.	28,000	10,000	18,000
Jun.	12,000	5,000	7,000
Jul.	22,000	10000	12,000
Aug.	13,000	6,000	7,000

Sep	22,000	10,000	12,000
Oct.	29,000	8,000	11,000
Nov.	18,000	7,500	10,500
Dec.	30,000	12,000	28,000

<Table 1 Data to Be Transformed to XML Format>

< XML Data Format>

```
<items>
    <item>
        <Month>Jan</Month>
        <Revenue>10000</ Revenue >
        <Cost>5000</Cost>
        <Profit>5000</Profit>
    </item>
    <item>
        <Month>Feb</Month>
        <Revenue>15000</Revenue>
        <Cost>7000</Cost>
        <Profit>8000</Profit>
    </item>
                .
                .
                .
    <item>
        <Month>Dec</Month>
        <Revenue>30000</Revenue>
        <Cost>12000</Cost>
        <Profit>18000</Profit>
    </item>
</items>
```

You should start with the <item> tag and end with the </item> tag for each data.

<Example 3 XML Data Format>

Once you create the XML-formatted data and save the file as the filename, multiData.xml, you need to pass the URL of the filename as a parameter of the setDataURL() function as follows:

document.getElementById("chart1").setDataURL(http://www.koolchart.com/singleData.xml);

Note: Because the setDataURL() function is using the RPC method, the URL does not have to have the name of the XML file. As long as the data returned by the URL is an XML format, you can set any type of server-side script name (ex, JSP, PHP, etc.,) as an URL.

3.2. Array – Creating an Array Data

Here is an example of using the Array-formatted data for a monthly report for profit (1 numeric data).

Month	Profit
Jan.	10,000
Feb.	15,000
Mar.	12,000
Apr.	30,200
May.	28,000
Jun.	12,000
Jul.	22,000
Aug.	13,000
Sep	22,000
Oct.	29,000
Nov.	18,000
Dec.	30,000

```
var chartData = [{"Month":"Jan", "Profit":10000},
        {"Month":"Feb", "Profit":15000},
        {"Month":"Mar", "Profit":12000},
        {"Month":"Apr", "Profit":30200},
        {"Month":"May", "Profit":28000},
        {"Month":"Jun", "Profit":12000},
        {"Month":"Jul", "Profit":22000},
        {"Month":"Aug", "Profit":13000},
        {"Month":"Sep", "Profit":22000},
        {"Month":"Oct", "Profit":29000},
        {"Month":"Nov", "Profit":18000},
        {"Month":"Dec", "Profit":30000} ];
```

<Example 4 Transforming a Single Dataset to the Array Data Format>

And the following is an example of the Array-formatted data for a monthly report for profit, cost and revenue (multiple datasets).

```
var chartData = [{"Month":"Jan", "Revenue":10000, "Cost":5000, "Profit":5000},
        {"Month":"Feb", "Revenue":15000, "Cost":7000, "Profit":8000},
        {"Month":"Mar", "Revenue":12000 , "Cost":6000, "Profit":6000},
        {"Month":"Apr", "Revenue":30200, "Cost":4000, "Profit":26200},
        {"Month":"May", "Revenue":28000, "Cost":10000, "Profit":18000},
        {"Month":"Jun", "Revenue":12000, "Cost":5000, "Profit":7000},
        {"Month":"Jul", "Revenue":22000, "Cost":10000, "Profit":12000},
        {"Month":"Aug", "Revenue":13000, "Cost":6000, "Profit":7000},
```

```
{"Month":"Sep", "Revenue":22000, "Cost":10000, "Profit":12000},
{"Month":"Oct", "Revenue":29000, "Cost":8000, "Profit":21000},
{"Month":"Nov", "Revenue":18000, "Cost":7500, "Profit":10500},
{"Month":"Dec", "Revenue":30000, "Cost":12000, "Profit":18000}];
```

<Example 5 Transforming a Multiple Datasets to the Array Data Format>

You can pass the Array-formatted data above to the chart as follows:

The variable name, chartData, is passed to the setData() function as a parameter.

```
document.getElementById("chart1").setData(chartData);
```

4. KoolChart System Interfacing

4.1. Setting chartVars

chartVars is the indispensable variable of KoolChart and it is used to set layout and dataset. This variable is passed to KoolChart as a parameter from your JavaScript.

The following rules are for the chartVars variable.

- The type of chartVars is string.
- The separator & is used to set more than 2 variables to the value of chartVars. The method to set a dataset and a layout to the value of chartVars is as follows:

```
var layoutURL = "./Column_3D_Layout.xml";
var chartVars = "layoutURL="+layoutURL;

var dataURL = "./singleData.xml";
chartVars += "&dataURL="+dataURL;
```

The following table shows the properties can be set by using chartVars.

Properties	Values	Descriptions
layoutURL	URL	layout URL
dataURL	URL	dataset URL
KoolOnLoadCallFunction	JavaScript function name	This function is called when KoolChart is ready to be created (executed only one time). Parameter: ID – User-defined ID
displayCompleteCallFunction	JavaScript function name	This function is called when KoolChart is completely rendered. Parameter: ID – User-defined ID

<Table 2 Properties of chartVars>

- The difference between KoolOnLoadCallFunction and displayCompleteCallFunction.

KoolOnLoadCallFunction is used to set the data and the layout to create the chart and called when KoolChart is ready to be created.

displayCompleteCallFunction is useful when you want to do additional jobs after the chart has been

created. It is called when KoolChart is completely rendered.

```
var KoolOnLoadCallFunction = "KoolChartOnLoad";
chartVars = "KoolOnLoadCallFunction="+KoolOnLoadCallFunction;

function KoolChartOnLoad(id)
{
    ...
    ...
}
```

<Example 6 Usage Example: chartVars>

Once you set chartVars as above, you should pass the chartVars variable to the KoolChart.create() function as a parameter as follows:

```
KoolChart.create("chart1", "chartHolder", chartVars,   500, 500);
```

4.2. Interface Functions

KoolChart provides you with the following functions. You can use these functions to set the dataset and the layout.

1. setDataURL(value): Sets the value of the XML-formatted data URL.
2. setLayoutURL (value): Sets the value of the XML-formatted layout URL.
3. setData (value): Sets the value of the Array-formatted or XML-formatted data string.
4. setLayout (value): Sets the value of the layout string.
5. setSlideDataSet (value): Sets the datasets used in the Slide chart.
6. setSlideLayoutSet (value): Sets the layouts used in the Slide chart.
7. saveAsImage(): Gets the snapshot of the image of the chart.
8. getSnapshot(): Gets the base64-encoded snapshot of the image of the chart to send the image of the chart to the server.
9. resize(): Resize the chart.
10. legendAllCheck(value): Used to control the checkboxes of the legend (check all/clear all). It is useful to check all or to clear all the legend checkboxes when the value of the *useVisibleCheck* property is true.
11. showAdditionalPreloader(): Shows Preloader.
12. removeAdditionalPreloader():Removes Preloader.

13. visibleItemSize(): Defines the number of items shown in the scroll chart.
14. hasNoData(): Pops up the message box when the chart has no data.
15. changeScrollBarSize(): Changes the size of the scroll bar.

By using the functions above, you can have the 6 combinations of functions to set the layout and the dataset as follows:

	Layout	Data	Functions
Method 1	XML URL	XML URL	setLayoutURL(URL), setDataURL(URL)
Method 2	XML URL	String	setLayoutURL(URL), setData(Array)
Method 3	XML URL	XML String	setLayoutURL(URL), setData(String)
Method 4	String	XML URL	setLayout(String), setDataURL(URL)
Method 5	String	Array	setLayout(String), setData(Array)
Method 6	String	XML String	setLayout(String), setData(String)

<Table 3 Methods to Set the Layout and the Dataset>

You can change the layout and the dataset dynamically using the functions above. In order to see the usage example of the functions above, you can refer to the samples included in the installation CD.
Go to the Chart Samples tab of the sample and click "Chart Apperances & Data Integrations"

5. Using Layouts

5.1. About Layouts

The layout of KoolChart begins with the <KoolChart> tag and end with the </KoolChart> tag. It consists of 3 parts, which are <Options>, <Chart> and <Style>. You can add the caption/sub-caption and the legend by setting the values in the <Options> tag.

The format of the KoolChart layout is XML.

The following example shows the normal process of setting the value of properties. <*fill*> is a property of the Column3DSeries object. You can create the SolidColor instance as the value of the <*fill*> property as follows:

```
<KoolChart>
    <Column3DChart showDataTips="true">
                .
                .
                .
        <series>
            <Column3DSeries yField="Profit">
                <fill>
                    <SolidColor color="0xFF0000">
                </fill>
            </Column3DSeries>
        </series>
    </Column3DChart>
</KoolChart>
```

<Example 7 Example: How to Create the Property Value>

For user's convenience, KoolChart provides another method to create the instance value of properties. You can create the ID for the value of a property in advance and use the ID for the instance value. This method is useful when an object is used for the value of more than one property.
Once you define a SolidColor ID, you can use the ID to refer to the SolidColor instance whenever you want to use the values. For example:

```
<KoolChart>
    <SolidColor id="color1" color="0xFF0000"/>
    <Column3DChart showDataTips="true">
                .
                .
```

```
        .
        <series>                                    //The ID should be enclosed in the curly braces
            <Column3DSeries yField="Profit" fill="{color1}"/>
            <Column3DSeries yField="Cost" fill="{color1}"/>
        </series>
    </Column3DChart>
</KoolChart>
```

<Example 8 Example: How to Create the Property Value Using the ID>

A good usage example of the object ID is that after creating two vertical axes with the object IDs, make two different series refer to each vertical axis using the IDs.

Regardless of the chart type, the terms, Chart and Series, will be used frequently in this document. The following table describes key concepts of Chart and Series.

	Descriptions	Remarks
Chart	It represents the visual part of the chart. It defines the appearances of the chart such as axes, background, size, etc. The most important role of Chart is to specifiy the position (coordinates) of the series.	ColumnChart, Column3DChart, PieChart, Pie3DChart, BarChart, etc
Series	It represents the actual data. If you have three numeric data for a chart, you need to define three series for each data.	ColumnSeries, Column3DSeries, BarSeries, Pie3DSereis, etc

<Table 4 Descriptions of Chart and Series >

5.2. Setting KoolChart in Layouts

The KoolChart node (tag) indicates the start/end of the layout. The main role of the KoolChart node (tag) is to decorate the overall design of the chart.

The following example shows how to use the properties of KoolChart.

```
<KoolChart cornerRadius="12" borderStyle="solid" backgroundColor="0xFFFF77">
        <Options>
            <Caption text="Anual Report" />

                ......

</KoolChart>
```

<Example 9 Example: Layout of the Properties of the KoolChart Node>

5.3. Setting Options in Layouts

The Options node in the layout is optional, not mandatory. This tag can be used to add the title, subtitle and legend in the chart.

```
<KoolChart>
        <Options>
                <Caption text="Annual Report"/>   // Title
                <SubCaption text="2008"/>   //Subtitle
                <Legend/>   //Legend
        </Options>
        <Column3DChart showDataTips="true" width="100%" height="100%" >
            <series>
                <Column3DSeries yField="Profit" displayName="Profit">
                .
                .
                .
        </Column3DChart>
</KoolChart>
```

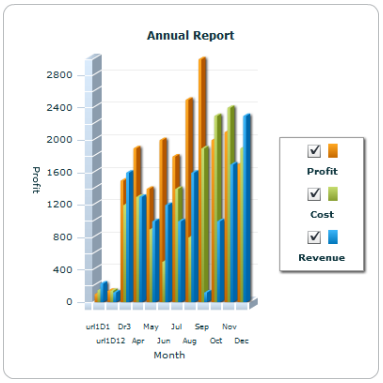
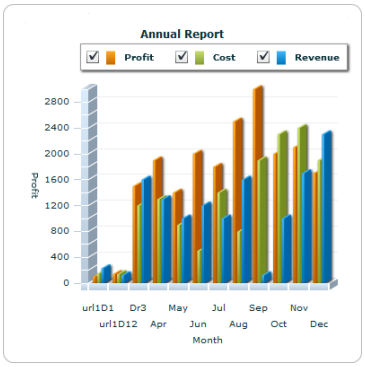
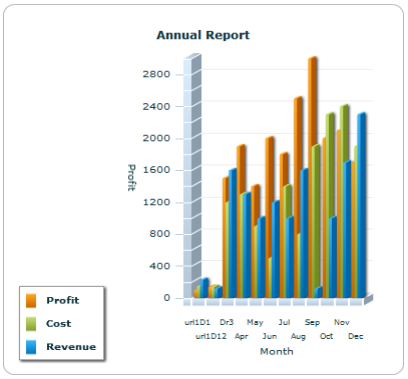
<Example 10 Usage Example: Options>

5.3.1. Creating Captions and Subcaptions

<Example 10 Usage Example: Options> shows the layout for a Column3D chart. You can create the title by setting the title text as the value of the *text* property in the Caption tag.

5.3.2. Creating Legends

The legend is used to display the titles of each series in the multiple series chart. In order to use the legend, you can specify the value of the *displayName* property of the series (For example, if you want to create the Column3D chart, you need to specify the name of the series as Column3Dseries) in the chart. The value of the *displayName* property will be displayed in the legend.

OUTPUTS			
PROPERTIES	position="right" direction="vertical" useVisibleCheck="true" vAlign="middle"	position="top" direction="horizontal" useVisibleCheck="true" hAlign="right"	position="left" direction="vertical" useVisibleCheck="false" vAlign="bottom"

<Example 11 Example: Properties of Legend>

5.4. Setting Styles(CSS) in Layouts

The Style node is the style sheets specifying the format of the chart. To define Style node, check the following rules.

1. You should define the Style node as a child of the KoolChart node.
2. The style name begins with a dot (.) followed by the character string that begins with a lowercase first character.
3. The properties of the style should be enclosed in the curly brace ({}).
4. The colon (:) should be placed between the property name and the property value as a seperator and the property definition ends with the semicolon (;).

The following table shows the correct and incorrect examples.

Correct example	Incorrect example

<KoolChart>
<Options>
 	
...
 	
<Style>
.KoolChartStyle
{
backgroundColor:0xFFFFFE;
borderColor:0x77EE9E;
cornerRadius:12;
borderThickness:3;
borderStyle:solid;
}
<Style>
</KoolChart>
	<KoolChart>
	<Options>
	
	...
	
	<Style>
	ChartStyle
	[
	backgroundColor:0xFFFFFE;
	borderColor:"0x77EE9E";
	cornerRadius,12;
	borderThickness:3;
	borderStyle:'solid';
	]
	<Style>
	</KoolChart>

<Table 5 Example: Correct and Incorrect representations of the Style Node>

Once you create the style (KoolChartStyle) as above, you can apply the style as follows:

```
<KoolChart styleName="KoolChartStyle">
        <Options>
                <Caption text="Annual Report"/>
        </Options>

         ......

        <Style>
```

```
        .KoolChartStyle
        {
        backgroundColor:0xFFFFFE;
        borderColor:0x77EE9E;
        cornerRadius:12;
        borderThickness:3;
        borderStyle:solid;
        }
        <Style>

</KoolChart>
```

<Example 12 Example: How to Apply Styles 1>

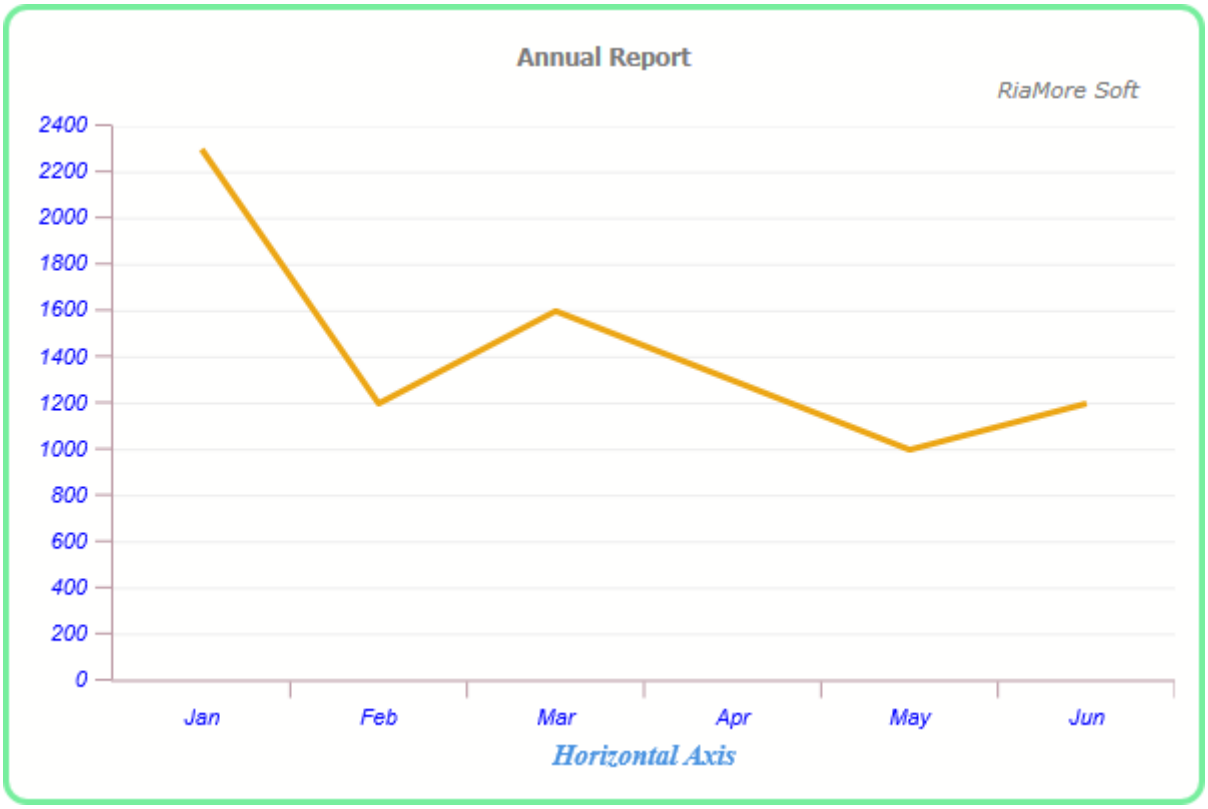
In the above example, KoolChartStyle is defined as a style of the KoolChart node. To apply the Style node to the chart, you need to set the value for the *styleName* property in the KoolChart node as follows: styleName="the style name you defined". i.e) styleName="KoolChartStyle"

The usage example of the style is as follows:

```
<KoolChart styleName="KoolChartStyle">
        <Options>
                <Caption text="Annual Report" styleName="captionStyle"/>
                <SubCaption text="RiaMore Soft" styleName="subCaptionStyle"/>
        </Options>
        <DateFormatter id="dateFmt" formatString="M/D"/>
        <NumberFormatter id="numFmt"/>
        <Line2DChart showDataTips="true" styleName="chartStyle">
                <horizontalAxis>
                        <CategoryAxis id="hAxis" categoryField="Month" title="Horizontal Axis"/>
                </horizontalAxis>
                <horizontalAxisRenderers>
                        <Axis2DRenderer axis="{hAxis}"  axisTitleStyleName="chartAxisStyle"/>
                </horizontalAxisRenderers>
                <series>
                        <Line2DSeries yField="Revenue" displayName="Revenue">
                                <showDataEffect>
                                        <SeriesInterpolate/>
                                </showDataEffect>
```

```
                    </Line2DSeries>
                </series>
        </Line2DChart>
        <Style>
                .KoolChartStyle    {
                        backgroundColor:#FFFFFE;
                        borderColor:#77EE9E;
                        cornerRadius:12;
                        borderThickness:3;
                        borderStyle:solid;
                }
                .captionStyle {
                        fontSize:12;
                        fontFamily:Tahoma;
                        fontWeight:bold;
                        color:#777777;
                }
                .subCaptionStyle {
                        fontSize:11;
                        fontStyle:italic;
                        color:#777777;
                }
                .chartStyle {
                        fontSize:11;
                        fontStyle:italic;
                        color:#0000FF;
                }
                .chartAxisStyle {
                        color : #4691E1;
                        fontSize : 14;
                        fontWeight : bold;
                        fontStyle : italic;
                }
        </Style>
</KoolChart>
```

<Example 13 Example: How to Apply Styles 2>



<Figure 2 Example: Output of the Chart with Styles>

6. Using Layouts for Chart Types

6.1. About Common Properties of Charts

Charts can be divided into two general categories, the Cartesian chart which has axes and the Polar chart which has no axis. The following table describes the properties of the Cartesian chart.

Properties	Values	Descriptions
horizontalAxis	CategoryAxis, LinearAxis, DateTimeAxis, LogAxis	Specifies the horizontal axis (X-axis).
verticalAxis	CategoryAxis, LinearAxis, DateTimeAxis, LogAxis	Specifies the vertical axis (Y-axis).
horizontalAxisRenderer	Axis3DRenderer, AxisRenderer	Specifies the renderer of the horizontal axis.
verticalAxisRenderer	Axis3DRenderer, AxisRenderer	Specifies the renderer of the vertical axis.
series	Chart series (ex, Column3DSeries, Line2DSeries, etc)	Specifies the series of the chart.
annotationElements	GridLines, Image, CanvasElement, CrossRangeZoomer, etc	Specifies the front elements of the chart (Z-index).
backgroundElements	GridLines, Image, CanvasElement, etc	Specifies the background elements of the chart.
showDataTips	true | false	Whether or not to display tooltips when mouseover event occurs.
paddingTop	Number	Specifies the top margin.
paddingBottom	Number	Specifies the bottom margin.
paddingLeft	Number	Specifies the left margin.
paddingRight	Number	Specifies the right margin.
itemClickJsFunction	JavaScript function	Specifies the name of the function called when the item is clicked.
dataTipJsFunction	JavaScript function	Specifies the name of the function called to display the user-defined tooltip.
gutterLeft	Number	Specifies the left margin of the axis.
gutterRight	Number	Specifies the rigth margin of the axis.

gutterTop	Number	Specifies the top margin of the axis.
gutterBottom	Number	Specifies the bottom margin of the axis.

<Table 6 Properties: Cartesian Chart>

The following table describes the properties of the Polar chart

Properties	Values	Descriptions
innerRadius	0.0 ~ 1.0 (default: 0.0)	Specifies the size of the empty space of the Doughnut chart. As the value reaches 1.0, the size of the empty space increases. (0.0 = Pie chart).
showDataTips	true | false (default: false)	Whether or not to display tooltips when mouseover event occurs.
explodable	true | false (default: true)	Whether or not to explode out a clicked piece of the doughnut (or pie).
series	PieGradationSeries, Pie3DSeries	Specifies the series of the chart.
itemClickJsFunction	JavaScript function	Specifies the name of the function called when the item is clicked.
dataTipJsFunction	JavaScript function	Specifies the name of the function called to display the user-defined tooltip.

<Table 7 Properties: Polar Chart>

6.2. About Axes of Cartesian Charts

Except Pie charts and Doughnut charts, all charts (Cartesian charts) have X-axes (horizontal axes) and Y-axes (vertical axes).

In charts, there are two types of axes. The one is the category type axis and the other is the numeric type axis. In the categroy type, there is only one axis, CategroyAxis, which is used to define the axis for the text labels. CategoryAxis is useful when you are not able to quantify the labels of the axis but you want to

group the labels. For example, you can use the text for the fields of the axis such as the departments (ex, Management Division, Research Department, etc) or month (ex, January, Febuary, etc).

In the numeric type axis, there are three types of axes, LinearAxis, LogAxis and DateTimeAxis. LinearAxis is used for continuous data (that is the general numeric value), LogAxis is used for the logarithmic function and DataTimeAxis is used for the date & time formatted axis.

The following table describes the axis-specific properties.

Axes	Properties	Values	Descriptions
CategoryAxis	categoryField	The field name (ex, Month)	Specifies the field name of the axis. You cannot omit this value in CategoryAxis.
	displayName	String (character string)	Specifies the text displayed in tooltips.
	title	Stirng (character string)	Specifies the title of the axis.
	labelJsFunction	JavaScript Function	Specifies the name of the function called to display the user-defined label.
LinearAxis	interval	Number	Specifies the gap between two consecutive labels.
	displayName	String (character string)	Specifies the text displayed in tooltips.
	minimum	Number	Specifies the minimum value of the axis label.
	maximum	Number	Specifies the maximum value of the axis label.
	title	Stirng (character string)	Specifies the title of the axis.
	labelJsFunction	Javascript Function	Specifies the name of the function called to display the user-defined label.
DateTimeAxis	dataUnits	milliseconds, seconds, minutes, hours, days, weeks, months, years	Specifies the unit of the data.
	labelUnits	milliseconds, seconds, minutes, hours, days, weeks, months, years	Specifies the unit of the label.
	title	Stirng (character string)	Specifies the title of the axis.
	interval	Number	Specifies the interval (time, date) between two consecutive labels. (If there is no enough space between two consecutive labels, the value will be ignored.)
	dataInterval	Number	Specifies the interval between two consecutive data. For example, If you set

			as dataUnits="second" and the actual interval between two consecutive data is 3 seconds, you should set as dataInterval=4. It means that KoolChart treats every 3 seconds as a unit and renders it at 4th position. (In some types of chart, this property can be ignored.)
	displayName	String (character string)	Specifies the text displayed in tooltips.
	displayLocalTime	false|true (default: false)	Specifies whether or not the local time zone is used. If the value is false, Greenwich Mean Time will be used.
	labelJsFunction	Javascript Function	Specifies the name of the function called to display the user-defined label.
LogAxis	interval	Multiplier of 10	Specifies the lables as the multiplier of 10.
	minimum	Number	Specifies the minimum value of the axis label.
	maximum	Number	Specifies the maximum value of the axis label.
	title	Stirng (character string)	Specifies the title of the axis.
	displayName	String (character string)	Specifies the text displayed in tooltips.
	labelJsFunction	JavaScript Function	Specifies the name of the function called to display the user-defined label.

<Table 8 Properties: Axes>

6.2.1. CategoryAxis and LinearAxis

In the following example, CategoryAxis is defined as the horizontal axis. The value of CategoryField should be the same as the item name of the data in the chart. In this example, the Month field in the data is used as the category name of the horizontal axis. If you do not define the axis, the default axis will be LinearAxis.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
  <Options>
    <Caption text="Anual Report"/>
  </Options>
  <Column3DChart showDataTips="true">

    <horizontalAxis>   // CategoryAxis is defined as the horizontal axis.
        <CategoryAxis categoryField="Month" title="Category Axis" />
    </horizontalAxis>
```

```
    <verticalAxis>   // LinearAxis is defined as the vertical axis.
        <LinearAxis maximum="3500" title="Linear Axis"/>
    </verticalAxis>
    <series>
        <Column3DSeries yField="Profit" displayName="Profit">
            <showDataEffect>
                <SeriesInterpolate />
            </showDataEffect>
        </Column3DSeries>
    </series>
  </Column3DChart>
</KoolChart>
```

<Example 14 Example: CategoryAxis and LinearAxis>

6.2.2. DateTimeAxis and LogAxis

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
  <Options>
      <Caption text="Anual Report"/>
  </Options>
  <Line2DChart showDataTips="true">

      <horizontalAxis> // DataTimeAxis is defined as the horizontal axis.
          <DateTimeAxis dataUnits="days" labelUnits="days" title="DateTime Axis" interval="3"
          displayName="Date" displayLocalTime="true"/>
      </horizontalAxis>

      <verticalAxis> // LogAxis is defined as the vertical axis.
          <LogAxis title="Log Axis" interval="10" minimum="10" maximum="10000" />
      </verticalAxis>
      <series>
          <Line2DSeries xField="Date" yField="Profit" displayName="Profit"/>
      </series>
  </Line2DChart>
</KoolChart>
```

<Example 15 Example: DateTimeAxis and LogAxis>

*** Note: If you want to use DataTimeAxis, you should define the DateTime field in the series.**

For example, if you want to use DateTimeAxis for the horizontal axis in the Column chart, you should specify xField (In the Bar chart, you should define yField for the vertical axis.). xField represents the field name of the corresponding time range. The usage of xField is same as that of cateogoryField in

CategoryAxis but you should define it as the property of the series (not the property of DateTimeAxis).

6.3. Column 2D Charts

The Column2D chart starts with the <Column2DChart> tag and ends with the </Column2Dchart> tag. You can define horizontalAxis, verticalAxis, backgroundElements, series, etc as the child node of the Column2DChart node.

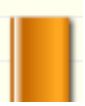
The following is an example of the Column2D chart with a single dataset (single series). In this layout, the Column2DSeries node is defined as a child node of the Column2DChart node, which means the data will be represented as a column series

The data representation of the chart is defined in series. You should make sure that the properties of series are correctly defined. The Chart node (ex, Column2DChart, Bar2Dchart, etc) is the parent node of series and it determines the overall appearances of the chart.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report"/>
        </Options>
        <Column2DChart showDataTips="true">
                <horizontalAxis>
                        <CategoryAxis categoryField="Month"/>
                </horizontalAxis>
                <series>
                        <Column2DSeries yField="Profit" itemRenderer="SemiCircleColumnItemRenderer">
                                <showDataEffect>
                                        <SeriesInterpolate/>
                                </showDataEffect>
                            <fill>
                                <SolidColor color="0xFF0000" alpha="0.5"/>
                            </fill>
                            <stroke>
                                <Stroke color="0xFFFF00" weight="1"/>
                            </stroke>
                        </Column2DSeries>
                </series>
        </Column2DChart>
</KoolChart>
```

<Example 16 Example: Column2D Chart >

The *itemRenderer* property of the Column2DSeries node determines the shape of each data item. The valid values of the *itemRenderer* property of the ColumnSeries series are SemiCircleColumnItemRenderer and GradientColumnItemRenderer.

- SemiCircleColumnItemRenderer
- GradientColumnItemRenderer 

6.4. Column 3D Charts

The Column3D chart starts with the <Column3DChart> tag and ends with the </Column3Dchart> tag. <Column3DSeries> is the series of the Column3D chart. The following layout shows the multiple series of the Column3D chart.

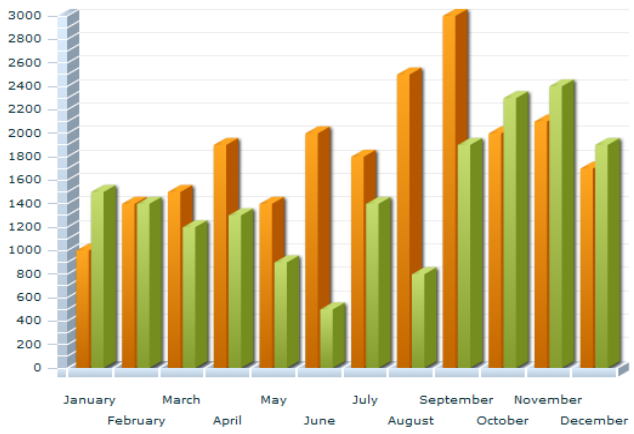
```
<KoolChart>
    <Column3DChart showDataTips="true" type="clustered">
            // Creating a Column3D chart.
    <horizontalAxis// Using CategoryAxis in X-axis and the value of the categoryField property is Month.
        <CategoryAxis categoryField="Month"/>
    </horizontalAxis>
    <series> // Setting the series node for the data.
        // Two column series are defined. (Profit and Cost are a pair of data)
       <Column3DSeries yField="Profit">
                        <showDataEffect> // Using the animation effect for data rendering.
                        <SeriesInterpolate/>
                        </showDataEffect>
        </Column3DSeries>
        <Column3DSeries yField="Cost"> // Using the Cost value for Y-axis.
                        <showDataEffect>
                          <SeriesInterpolate/>
                        </showDataEffect>
        </Column3DSeries>
  </series></Column3DChart></KoolChart>
```

<Example 17 Example: Column3D Chart>

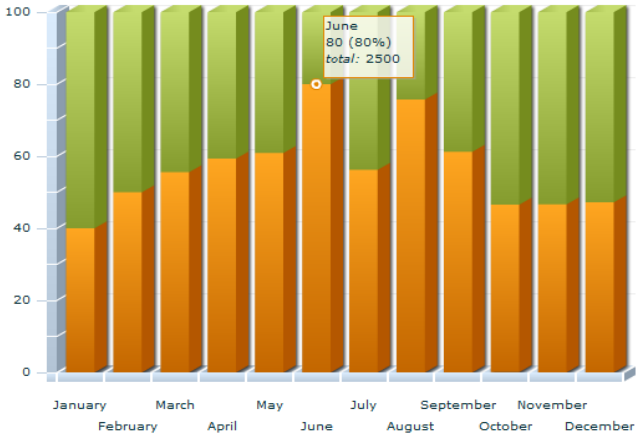
The *type* property of the Column chart determines the display method of the chart. The following four types are used in the Column chart.

- clustered: This is the default value for the Column chart. The clustered type is mostly used in the multiple dataset (multiple series).
- stacked: Data are stacked on the top of each other. Each data represents the cumulative value of the data beneath it.
- overlaid: Data are represented as the overlapped columns. The data in the back can be hidden.
- 100%: Data are stacked on the top of each other, adding up to 100%. Each data represents as a percentage.

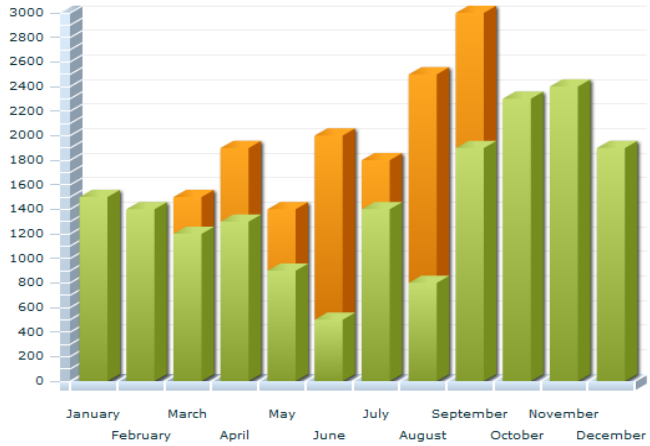
The following figures show the outputs of the types of the Column chart.



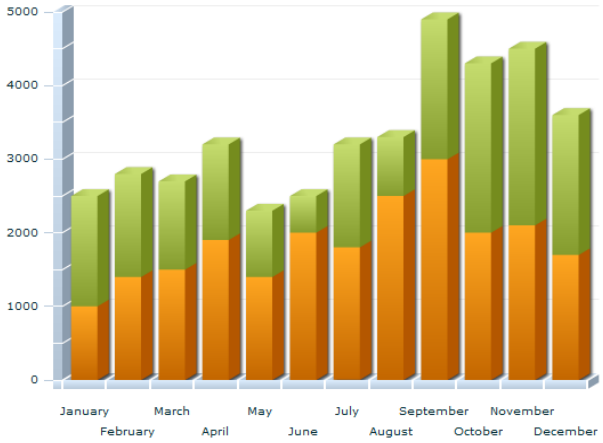
<type="clustered">



<type="100%">



<type="overlaid">



<type="stacked">

<Figure 3 Output: Types of the Column Chart>

6.5. Cylinder 3D Charts

6.5.1. Cylinder 3D Column Charts

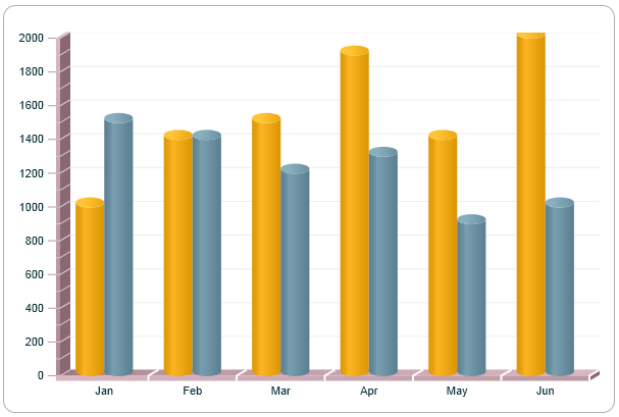
The Cylinder3D column chart is the same as the Column3D chart except the shape of the column. The cylinder-shaped column is used instead of the cube-shpaed column for the Cylinder3D column chart. All other properties of the Cylinder3D column in the layout are the same as those of the Column3D chart

You can create a Cylinder3D column chart by using the layout for the Column3D chart and just changing the value of the *itemRenderer* property to CylinderItemRender.

The following layout shows how to create a Cylinder3D column chart by changing the *itemRenderer* property of the layout for the Column3D chart shown in <Example 17 Example: Column3D Chart>.

```
<KoolChart>
    <Column3DChart showDataTips="true" type="clustered">
            //Creating a Cylinder3D column chart.
    <horizontalAxis//Using CategoryAxis in X-axis and the value of the categoryField property is Month.
        <CategoryAxis categoryField="Month"/>
    </horizontalAxis>
    <series> //Setting the series node for the data.
        // Two column series are defined. (Profit and Cost are a pair of data)
       <Column3DSeries yField="Profit" itemRenderer="CylinderItemRenderer">
                        <showDataEffect> //Using the animation effect for data rendering.
                          <SeriesInterpolate/>
                        </showDataEffect>
        </Column3DSeries>
        <Column3DSeries yField="Cost"// Using the Cost value for Y-axis.
itemRenderer="CylinderItemRenderer">
                        <showDataEffect>
                          <SeriesInterpolate/>
                        </showDataEffect>
        </Column3DSeries>
</series></Column3DChart></KoolChart>
```

<Example 18 Example: Cylinder3D Column Chart>



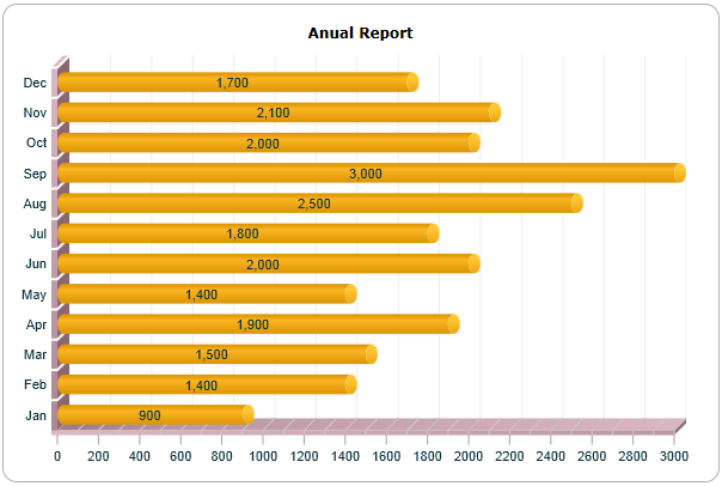
<*Figure 4 Output: Cylinder3D Column Chart*>

6.5.2. Cylinder 3D Bar Charts

The cylinder-shaped bar is used instead of the cube-shpaed bar for the Cylinder3D Bar chart. All other properties of the Cylinder3D Bar chart in the layout are indentical to those of Bar3D chart

You can create the Cylinder3D bar chart by using the layout for the Bar3D chart and just changing the value of the *itemRenderer* property to BarCylinderItemRender.

You can use the layout for the Cylinder3D column chart shown in <Example 18 Example: Cylinder3D Column Chart> to create a Cylinder3D bar chart by changing the value of the *itemRenderer* property to BarCylinderItemRender.



<*Figure 5 Output: Cylinder3D Bar Chart*>

6.6. Bar 2D Charts

The Bar chart is the same as the Column chart. The only difference is that in the Bar chart, the numeric data is displayed along X-axis (horizontal axis).

The Bar2D chart starts with the <Bar2Dchart> tag and ends with the </Bar2Dchart> tag.

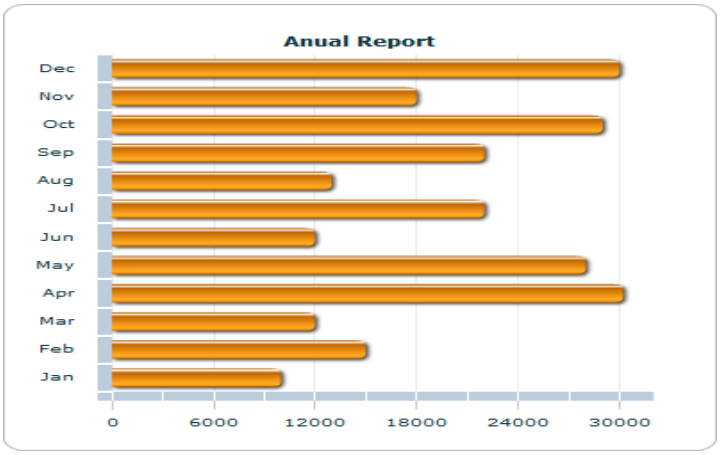
The valid values of the *itemRenderer* property of the Bar2D chart are SemiCircleBarItemRenderer and GradientBarItemRenderer.

- SemiCircleBarItemRenderer
- GradientBarItemRenderer

You can refer to the API document (./Docs/api) for further information of the Bar2Dchart properties.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report"/>
        </Options>
        <Bar2DChart showDataTips="true">
                <verticalAxis>
                        <CategoryAxis categoryField="Month"/>
                </verticalAxis>
                <series>
                        <Bar2DSeries xField="Profit" itemRenderer="SemiCircleBarItemRenderer">
                                <showDataEffect>
                                        <SeriesInterpolate/>
                                </showDataEffect>
                        </Bar2DSeries>
                </series>
        </Bar2DChart>
</KoolChart>
```

<Example 19 Example: Bar2D Chart>



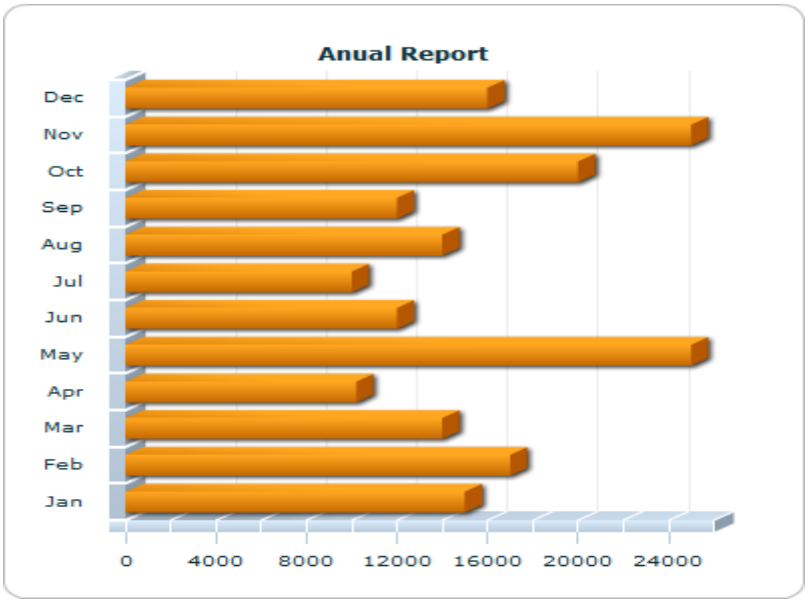
<Figure 6 Output: Bar2D Chart>

6.7. Bar 3D Charts

The definition of the Bar3D chart starts with the <Bar3Dchart> tag and ends with the </Bar3Dchart> tag. You can refer to the API document (./Docs/api) for further information of the Bar3Dchart properties.

```
<KoolChart>
    <Options>
        <Caption text="Annual Report"/>
    </Options>
    <Bar3DChart showDataTips="true">
        <verticalAxis>      //Using CategoryAxis in Y-axis (vertical axis) and the value of the categoryField property is Month.
            <CategoryAxis categoryField="Month" />
        </verticalAxis>
        <series>
            <Bar3DSeries xField="Profit">   //Using the Profit value for X-axis (xField)
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
            </Bar3DSeries>
        </series>
    </Bar3DChart>
</KoolChart>
```

<Example 20 Example: Bar3D Chart>



<Figure 7 Output: Bar3D Chart>

6.8. Pie and Doughnut Charts

The definition of the Pie2D chart and the Doughnut2D chart starts with the <Pie2Dchart> tag and ends with the </Pie2Dchart> tag. Also the definition of the Pie3D chart and the Doughnut3D chart starts with the <Pie3Dchart> tag and ends with the </Pie3Dchart> tag. The series of the Pie2D chart and the Doughnut2D chart is Pie2DSeries and the series of the Pie3D chart and the Doughnut3D chart is Pie3DSeries.

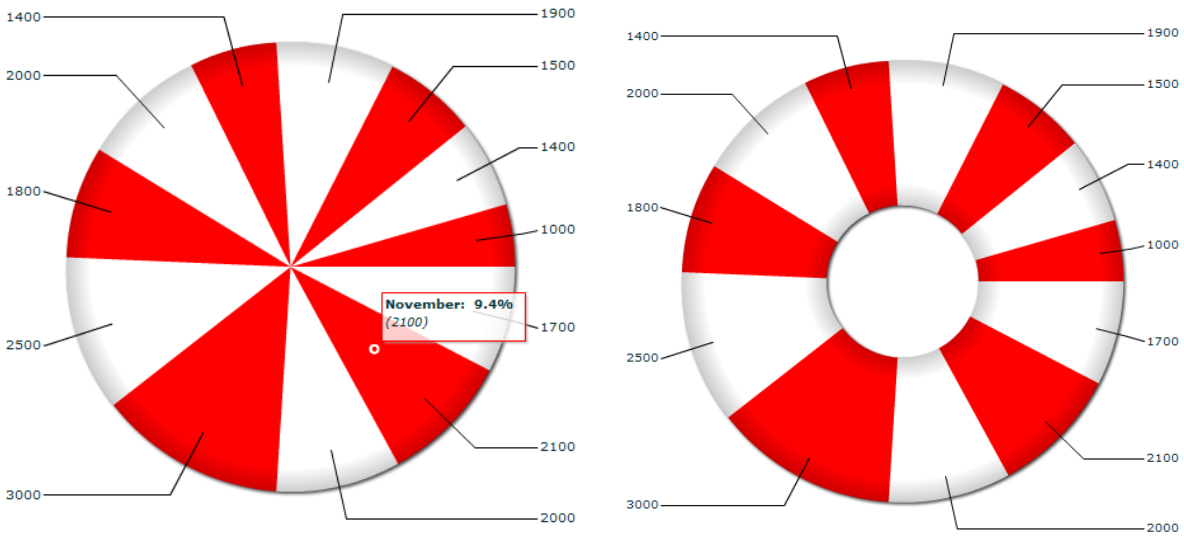
The layouts for the Pie chart and the Doughnut chart are same except the value of the *innerRadius* property in the layout.

The value of the *innerRadius* property is a percentage value of the hole compared to the entire pie's radius. The valid range of the value is from 0 to 1. The value of the *innerRadius* property for the Pie chart is 0 and as the value reaches 1, the size of the inner hole increases (0 = Pie chart).

```
<KoolChart>
  <Pie2DChart innerRadius="0" showDataTips="true">
    <series>
        <Pie2DSeries
            nameField="Month" //The field name displayed in tooltips
            field="Profit" // The numeric data field.
            depth="0.05" // The depth of the 2D chart (value range: 0 ~ 0.2)
             labelPosition="callout">
```

```
            <showDataEffect>    <!--Using the animation effect for data rendering.-->
                <SeriesInterpolate/>
            </showDataEffect>

            <fills> <!-- colors are used alternately to fill the slices. -->
                <SolidColor color="0xff0000"/>
                <SolidColor color="0xffffff"/>
            </fills>
        </Pie2DSeries>
    </series>
  </Pie2DChart>
<KoolChart>
```

<Example 21 Example: Pie2D Chart>



<innerRadius = 0> <innerRadius = 0.33>

<Figure 8 Output: Pie Chart and Doughnut Chart >

As you can see from the examples above, the value of the *innerRadius* property determines whether it will be the Pie chart or the Doughnut chart.

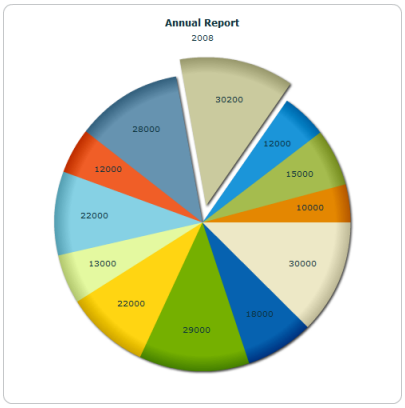
The value of the *labelPosition* property specifies the position where to place the labels of the Polar chart. The following describes the values of the *labelPosition* property.

- none: Does not draw the value of the numeric data.
- inside: Draws labels inside the chart.
- outside: Draws labels outside the chart.
- callout: Draws labels outside the chart with the line.

- insideWithCallout: Draws labels inside the pie but if the font size of the label is smaller than insideLabelSizeLimit, converts them to callout label.

You can explode out a single slice by clicking a slice of the Pie chart or the Doughnut chart. The default value of the *explodable* property is true.

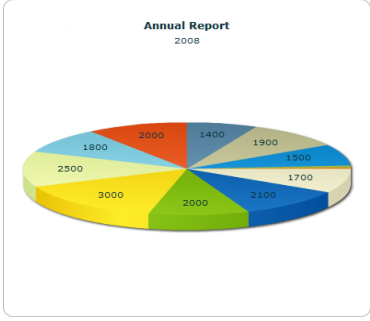
```
<rMateChart>
        <Options>
                <Caption text="Annual Report"/>
                <SubCaption text="2008"/>
        </Options>
        <Pie2DChart          explodable="true"          innerRadius="0"
showDataTips="true">
        ......
<rMateChart>
```



<Example 22 Layout and Output: Pie Chart with explodable="true">

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Annual Report"/>
                <SubCaption text="2008"/>
        </Options>
        <Pie3DChart showDataTips="true" explodable="false">
                <series>
                        <Pie3DSeries nameField="Month" field="Profit" labelPosition="inside">
                                <showDataEffect>
                                        <SeriesZoom/>
                                </showDataEffect>
                        </Pie3DSeries>
                </series>
        </Pie3DChart>
</KoolChart>
```

<Example 23 Example: Pie3D Chart>

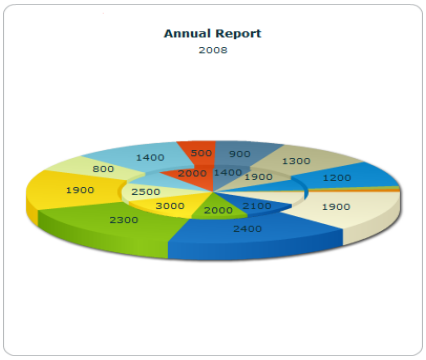


<*Figure 9 Output: Pie3D Chart*>

The Pie stacked 3D chart can be created with two series. The following is an example that shows the Pie stacked 3D chart.

```
<KoolChart cornerRadius="12" borderStyle="solid">
    <Options>
        <Caption text="Annual Report" />
        <SubCaption text="2008" />
    </Options>
    <Pie3DChart showDataTips="true" explodable="false">
        <series>
            <Pie3DSeries nameField="Month" field="Profit" displayName="Profit" labelPosition="inside">
                <showDataEffect>
                    <SeriesZoom />
                </showDataEffect>
            </Pie3DSeries>
            <Pie3DSeries nameField="Month" field="Cost" displayName="Cost" labelPosition="inside">
                <showDataEffect>
                    <SeriesZoom />
                </showDataEffect>
            </Pie3DSeries>
        </series>
    </Pie3DChart>
</KoolChart>
```

<*Example 24 Pie Stacked 3D Chart*>



<Figure 10 Output: Pie Stacked 3D Chart>

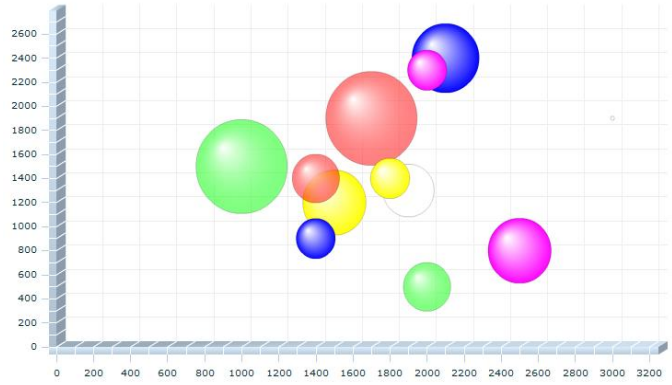
6.9. Bubble 3D Charts

The definition of the Bubble3D chart starts with the <Bubble3Dchart> tag and ends with the </Bubble3Dchart> tag. The series of the Bubble3D chart is Bubble3DSeries. The Bubble3D chart has a set of three numeric values. Each value represents the values of X, Y axes and radius. In a Bubble3D chart, the size of the bubbles is determined by the third value, radius.

As the series represents the numeric data, you should set the *xField*, *yField* and *radiusField* properties of the Bubble3DSeries node.

```
<KoolChart>
  <Bubble3DChart showDataTips="true">
    <series>
        <Bubble3DSeries xField="Profit" yField="Cost" radiusField="Revenue">

            <showDataEffect>
                <SeriesInterpolate />
            </showDataEffect>
            <fills>   <!-- 6 colors are used alternately to fill the bubbles. -->
                <SolidColor color="0xFF0000"/>
                <SolidColor color="0x00FF00"/>
                <SolidColor color="0x0000FF"/>
                <SolidColor color="0xFF00FF"/>
                <SolidColor color="0xFFFF00"/>
                <SolidColor color="0xFFFFFF"/>
            </fills>
        </Bubble3DSeries>
</series></Bubble3DChart></KoolChart>
```

<Example 25 Example: Bubble3D Chart>

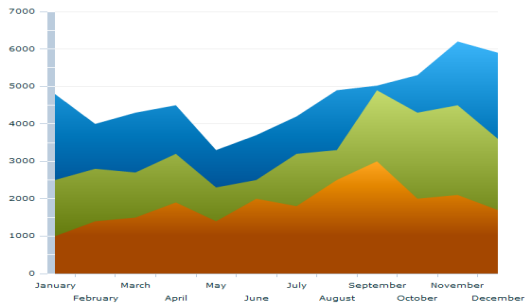


<Figure 11 Output: Bubble3D Chart>

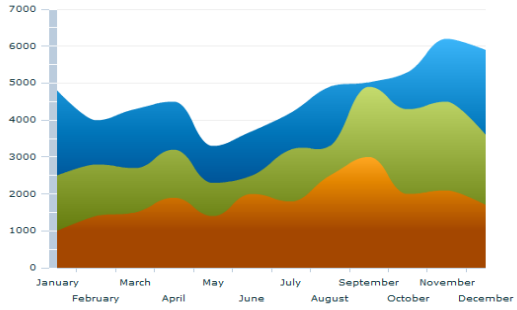
6.10. Area Charts

There are three types of area charts, which are overlaid, stacked and 100%. You can specify the type of the area chart by setting the *type* property of the chart. The display methods of the Area chart are identical to those of the Column chart. The definition of the Area chart starts with the <Area2DChart> tag and ends with the </Area2DChart> tag.

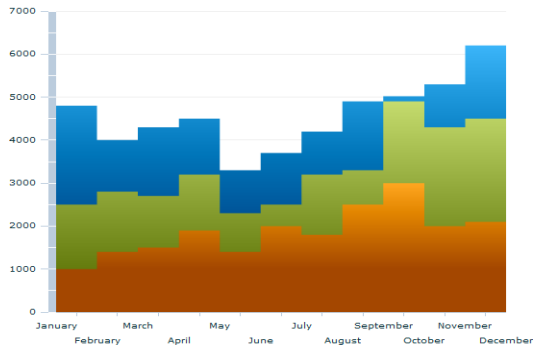
The *form* property of Area2DSeries determines how to display the series data.



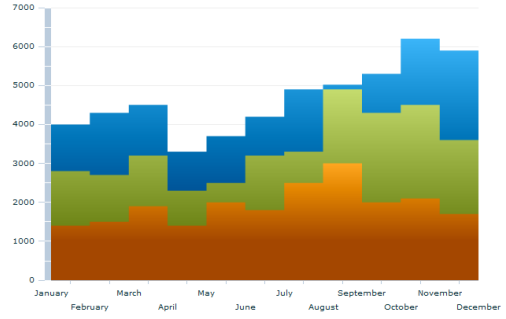
<form="segment" default>



<form="curve">



<form="step">

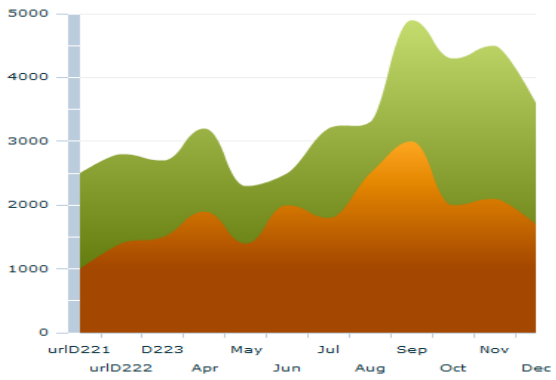


<form="reverseStep">

<Figure 12 Outputs: Each Type of the Area Chart >

```
<KoolChart>
    <Area2DChart showDataTips="true" type="stacked">
        <horizontalAxis>
            <CategoryAxis categoryField="Month" />
        </horizontalAxis>
        <series>
            <Area2DSeries yField="Profit" form="curve" displayName="Profit">
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
            </Area2DSeries>
            <Area2DSeries yField="Cost" form="curve" displayName="Cost">
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
            </Area2DSeries>
            <Area2DSeries yField="Revenue" form="curve" displayName="Revenue">
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
            </Area2DSeries>
        </series>
    </Area2DChart>
</KoolChart>
```

<Example 26 Example: Area Chart>



<Figure 13 Output: Area Chart>

6.11. Plot Charts

The Plot chart is used to represent data in Cartesian coordinates where each data points has one value

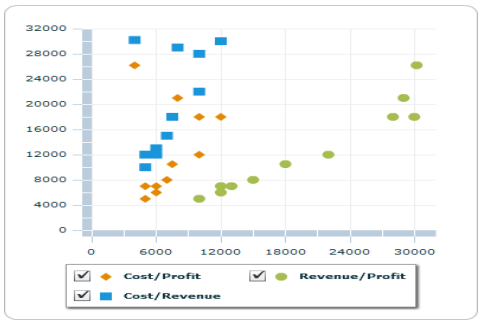
that determines its position along the x-axis, and one value that determines its position along the y-axis. The definition of the Plot2D chart starts with the <Plot2Dchart> tag and ends with the </Plot2Dchart> tag. The series of the Plot2D chart is Plot2DSeries.

Note: Both of *xField* and *yField* are required for each PlotSeries in the Plot2D chart.

The following is a sample layout and its output for the Plot chart.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
    <Options>
        <Legend useVisibleCheck="true" />
    </Options>
    <Plot2DChart showDataTips="true"> // Creating a Plot chart
        <verticalAxis>
            <LinearAxis maximum="3500" />
        </verticalAxis>
        <horizontalAxis>
            <LinearAxis maximum="2800" />
        </horizontalAxis>
        <series>
            <Plot2DSeries xField="Cost" yField="Profit" radius="5" displayName="Cost/Profit">
            </PlotSeries>
            <Plot2DSeries xField="Revenue" yField="Profit" radius="5" displayName="Revenue/Profit">
            </Plot2DSeries>
            <Plot2DSeries xField="Cost" yField="Revenue" radius="5" displayName="Cost/Revenue">
            </Plot2DSeries>
        </series>
</Plot2DChart>
</KoolChart>
```

< Example 27 Example: Plot Chart>



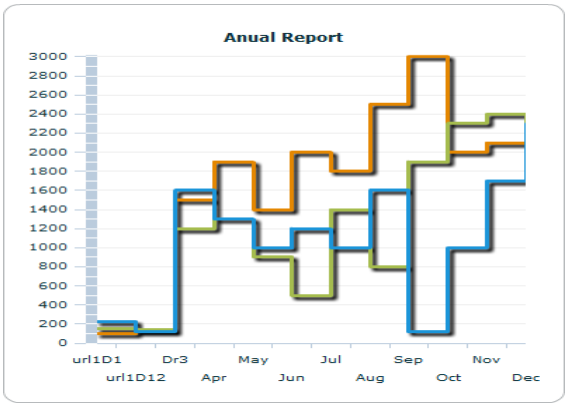
< Figure 14 Output: Plot Chart>

6.12. Line Charts

Unlike other Cartesian charts, the Line chart does not have the *type* property. It only has the overlaid type. The series of the Line chart is Line2DSeries. Like Area2DSeries, Line2Dseries has the *form* property that specifies the way in which the data series is shown in the chart. The valid values of the *form* property are segment, curve, step and reverseStep.

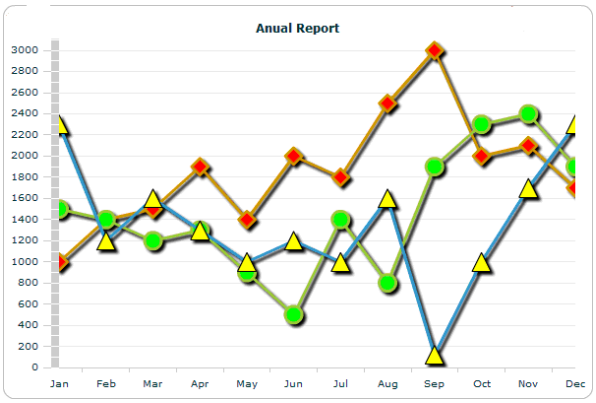
```
<KoolChart cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report" />
        </Options>
        <Line2DChart showDataTips="true">
                <horizontalAxis>
                        <CategoryAxis categoryField="Month" />
                </horizontalAxis>
                <series>
                        <Line2DSeries yField="Profit" form="step">
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                        </Line2DSeries>
                        <Line2DSeries yField="Cost" form="step">
                        </Line2DSeries>
                        <Line2DSeries yField="Revenue" form="step">
                        </Line2DSeries>
                </series>
        </Line2DChart>
</KoolChart>
```

< *Example 28 Example: Line Chart*>



< *Figure 15 Output: Line Chart*>

In the Line chart, you can define the shape, such as circle, triangle and rectangle, etc, which are displayed at the data points (x, y coordinates) by using itemRenderer for the data series.



< *Figure 16 Output: Line Chart with itemRenderer*>

```
<KoolChart cornerRadius="12" borderStyle="solid" paddingTop="10" paddingBottom="20" paddingRight="20"
paddingLeft="20">
        <Options>
                <Caption text="Anual Report" />
        </Options>
<Line2DChart showDataTips="true">
        <horizontalAxis>
        <CategoryAxis categoryField="Month"/>
    </horizontalAxis>
    <series>
            1 <Line2DSeries yField="Profit"  radius="10" fill="0xFF0000"  itemRenderer="
DiamondItemRenderer"/>

            2 <Line2DSeries yField="Cost"  radius="10" fill="0x00FF00" itemRenderer="CircleItemRenderer"/>

            3 <Line2DSeries yField="Revenue"  radius="10" fill="0xFFFF00"
itemRenderer="TriangleItemRenderer"/>
    </series>
</Line2DChart>
</KoolChart>
```

<Example 29 Example: Line Chart with itemRenderer>

You can use the following properties for itemRenderer.

- radius: Specifies the size of the shape (circle, triangle, rectangle, etc). The center of the radius is the x, y coorinates of the data points.
- fill: Fills the shape with the colors.
- stroke: Specifies the border thickness of the shape.

The line thickness and the color of the Line chart are determined by lineStroke. Please refer to <Example 49 Example: Layout and Output of the Line Chart with Stroke> for further information.

The followings are the values for the *itemRenderer* property of the Line chart.

- DiamondItemRenderer – No 1 in the example, <Example 29 Example: Line Chart with itemRenderer>.
- CircleItemRenderer – No 2 in the example, <Example 29 Example: Line Chart with itemRenderer>.
- TriangleItemRenderer – No 3 in the example, <Example 29 Example: Line Chart with itemRenderer>.
- CrossItemRenderer - cross-shaped
- XShapeItemRenderer - X-shaped
- IShapeItemRenderer – I-shaped
- RectangleItemRenderer – Square-shaped

6.13. Dashed-Line Charts

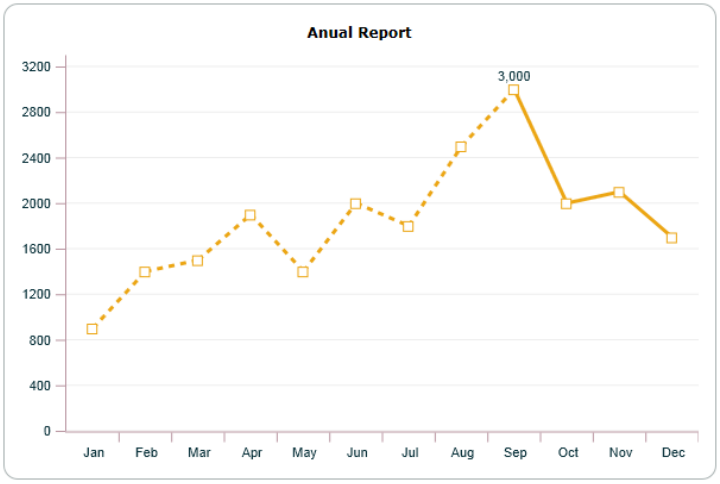
The Dashed-Line chart has all the features of the Line chart and the format of the layout is identical to that of the Line chart. The following table shows the properties of the Dashed-Line chart.

Properties	Values	Descriptions
lineStyle	normal, dashLine	Specifies the line type. To create the Dashed-Line chart, set the value of the *lineStyle* property to dashLine.
dashLinePlacement,	before, after	If the dashLineSeperatePos properity is set, dashLinePlacement determines the place of the dashed-line (before or after dashLineSeperatePos).
dashLineSeperatePos	The index of data (uint)	If you want to use the dashed-line and the normal line at the same time in the chart, dashLineSeperatePos determines the position of the boundary between the dashed-line and the normal line. The position of dashLineSeperatePos is the index of data.
dashLinePattern	Number (pixel) (default: 10)	Specifies the length of each dash. For example, if you set the value to 5, both the dashes and spaces will be 5 pixels in size. The larger the value, the better performance you can have. If you want to improve the chart rendering performance, use the larger value of dashLinePattern.

<Table 9 Properties: Dashed-Line Chart>

```
<KoolChart backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">

        <Line2DChart showDataTips="true" >
                <horizontalAxis>
                        <CategoryAxis categoryField="Month" padding="0.5" />
                </horizontalAxis>
                <series>
                        <Line2DSeries labelPosition="up"
                yField="Profit" radius="4
                lineStyle="dashLine"          // Creating a Dashed-Line chart
                dashLineSeperatePos="5"     // The position of the boundary (The 6th data)
                dashLinePlacement="before" // Displays the dashed-line first
                itemRenderer=" RectangleItemRenderer">
                        </Line2DSeries>
                </series>
        </Line2DChart>
</KoolChart>
```

<Example 30 Example: Dashed-Line Chart>



<Figure 17 Output: Dashed-Line Chart>

6.14. Combination Charts

The Combination chart can be created by using two different chart types. The following example describes how to create the Combination chart with the Column chart and the Line chart.

- The Column chart represents data series using Column2DSeries or Column3DSeries. However, since the Combination chart uses the series of the Column chart and the Line chart at the same time, Column2DSet or Column3DSet should be defined to combine column series.

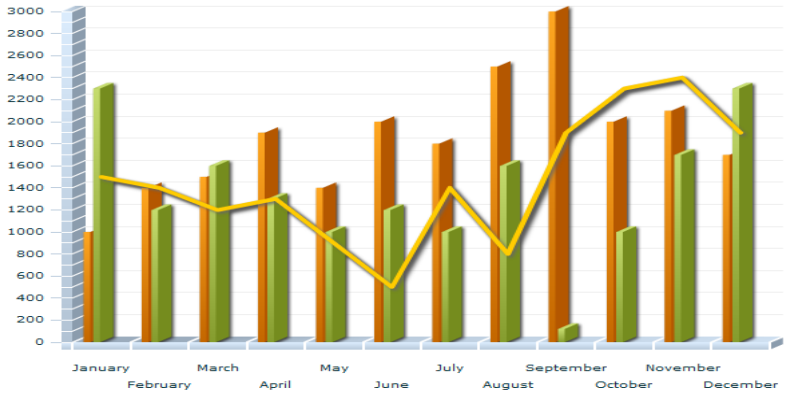
- To create the Combination 2D chart, define Column2DSet and then create Column2DSeries as the child of Column2DSet.
- The type of Column2DSet or Column3DSet is the same as those of other charts. The default value is overlaid.
- Create Line2DSeries as the sibling of Column2DSet.

The following layout shows how to create the Combination chart with the Column chart and the Line chart as described above.

```
<KoolChart>
    <Combination2DChart showDataTips="true">
        <horizontalAxis>
            <CategoryAxis categoryField="Month"/>
        </horizontalAxis>

        <series>
            <Column2DSet type="clustered">
                <series>
                    <Column2DSeries yField="Profit" displayName="Profit"/>
                    <Column2DSeries yField="Revenue" displayName="Revenue"/>
                </series>
            </Column2DSet>
            <Line2DSeries  yField="Cost" displayName="Cost">
                <lineStroke> // Specifies the thickness and the color of the line.
                    <Stroke color="0xFFCC00" weight="4"/>
                </lineStroke>
            </Line2DSeries>
        </series>
    </Combination2DChart>
</KoolChart>
```

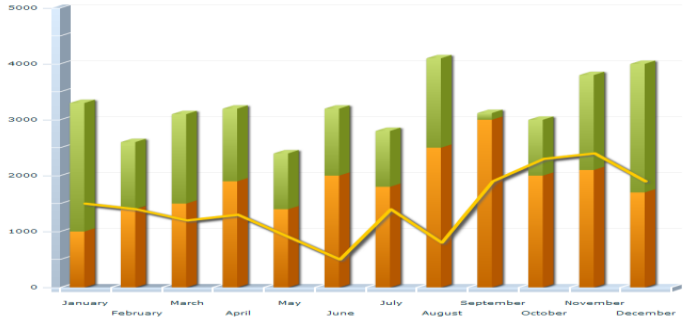
<Example 31 Example: Combination Chart>

The following outputs are the running results of the above layouts.



<Figure 18 Output: Combination Chart with type="clustered">

If you want to display the stacked column, set the value of the *type* property to "stacked".



<Figure 19 Output: Combination Chart with type="stacked">

6.15. Real-Time Charts

The Real-time chart is useful when you need to monitor real-time data, which is changing continuously.

The definition of the Real-time chart starts with the <RealTimeChart> tag and ends with the </RealTimeChart> tag. For the series of the Real-time chart, you can specify column series, line series or area series. HttpsServiceRepeater has the role of initiating RPC (Remote Procedure Call), which is used to read data from servers and should be defined in the layout

To create the Real-time chart, you should keep in mind the following rules.

1. The HttpServiceRepeater node must be created as the child node of <KoolChart> and the sibling node of <RealTimeCartesianChart>.
2. Set the value of the *target* property to the ID of the Real-time chart.
3. The URL of HttpServiceRepeater is the path of XML. The format of the XML data must be written as follows:

```
<?xml version="1.0" encoding="utf-8" ?>
<items>                          // Starts with the items node.
    <item>                       // Each data item should be enclosed in <item></item>.
        <Time>13:8:27</Time>
        <Volume>5527</Volume>
        <Price>309</Price>
    </item>
</items>
```

<Example 32 Example: Real-time Chart>

When you create the Real-time chart in your web page, you don't have to add the initial data.

* Note: If the value of the *interval* property in the Real-time chart is 5 (5 seconds), KoolChart will pull the data from servers every 5 seconds but in the real service enviromment, several factors (network link status, communication status, traffic, etc.) may cause some delays. The server-side programmer should consider those factors to develop the program that pull the real-time data.

The Real-time chart uses two data types to represent data.

1. The number of data: As soon as the Real-time chart receives the data, it displays the predefined number of data immediately and then displays the next data one by one. For example, if you set the value of displayDataSize to 20, it will display 20 data at once and then refresh the chart with the next data.

2. Time: The Real-time chart displays data based on the time. For example, if you set the value of timePeriod to 3600 seconds (1 hour) and set the value of interval to 3, the Real-time chart will display data every 3 seconds for 1 hour. After 1 hour, it will refresh the chart with the next data (The value of interval should be the same as that of HttpServiceRepeater).

6.15.1. Creating Real-Time Charts Based on the Number of Data (Using CategoryAxis)

If you want to display the Real-time chart based on the number of data, you have to use CategoryAxis.

CategoryAxis is not continuous and it recognizes each of the category fields as a separate field. For example, if you have the date or time related data, CategoryAxis will recognize it as a simple string. The drawback with CategoryAxis is that it may display duplicate data along the axis as it is not continuous.

```
<KoolChart cornerRadius="12" borderStyle="solid">
        <RealTimeChart id="chart" dataDisplayType="dataSize" displayDataSize="15" showDataTips="true">
                <horizontalAxis>
                        <CategoryAxis id="hAxis" categoryField="Time"/>
                </horizontalAxis>
                <series>
                        <Column2DSeries yField="Volume" displayName="Trading Volume"
itemRenderer="net.riamore.rmate.charts.renderers.GradientColumnItemRenderer">
                                <fill> // fills the column with the color
                                        <SolidColor color="0xB0C759" />
                                </fill>
                        </Column2DSeries>
                </series>
        </RealTimeChart>
        <HttpServiceRepeater url="http://demo.riamore.net/chartTest/data.jsp" target="{chart}" interval="3"
method="get" /> // Performs data refreshes every 3 seconds
</KoolChart>
```

<Example 33 Example: Real-time Chart Using CategoryAxis>

6.15.2. Creating Real-Time Charts Based on Time (Using DateTimeAxis)

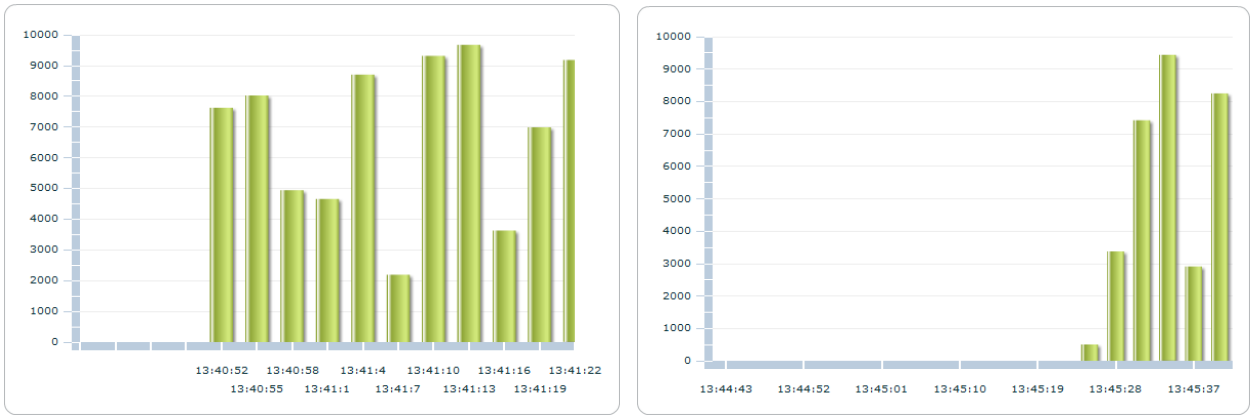
If you want to display the Real-time chart based on time, you have to use DataTimeAxis. DateTimeAxis is continuous and discards duplicate data. For example, if KoolChart receive the previously missing data (duplicated data) caused by some error, the data will be ignored. And if KoolChart cannot receive the data in the correct order, DateTimeAxis will display a blank for the missed data. You can use DateTimeAxis for the typical Rea-time chart.

```
<KoolChart cornerRadius="12" borderStyle="solid">
        <RealTimeChart id="chart" dataDisplayType="time" timePeriod="60" interval="3" showDataTips="true"> //
Performs data refreshes every 3 seconds for 60 seconds.
                <horizontalAxis>
              // Seconds is the unit of dataUnits and labelUnits and the data refresh interval is 3 seconds and the
              label interval is 9 seconds.
                        <DateTimeAxis dataUnits="seconds" labelUnits="seconds" dataInterval="3" interval="9"
displayLocalTime="true"/>
                </horizontalAxis>
                <series> // xField should be set as DateTimeAxis is used.
                        <Column2DSeries xField="Time" yField="Volume" displayName="Trading Volume"
```

```
itemRenderer="net.riamore.rmate.charts.renderers.GradientColumnItemRenderer">
                                        <fill>
                                                <SolidColor color="0xB0C759" />
                                        </fill>
                                </Column2DSeries>
                        </series>
                </RealTimeChart>
                <HttpServiceRepeater url="http://demo.riamore.net/chartTest/data4.jsp" target="{chart}" interval="3"
method="get" />
</KoolChart>
```

<Example 34 Example: Real-time Chart by Using DateTimeAxis>

*** Note: You should set the same value for the interval property of RealTimeChart, DateTimeAxis and HttpServiceRepeater.**



<Figure 20 Outputs: Real-time Chart (CategoryAxis: Left, DateTimeAxis: Right)>

6.15.3. Using HttpServiceRepeater in Charts

HttpServiceRepeater can be used for different types of charts other than Real-time charts.

For example, if you have created a Column3D chart and want to perform data refreshes every 1 minute, HttpServiceRepeater is useful. Use the layout of the Column3D chart and just add HttpServiceRepeater in the layout as follows:

```
<KoolChart cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report" />
        </Options>
        <Column3DChart id="chart" showDataTips="true">
                <horizontalAxis>
```

```
                    <CategoryAxis categoryField="Month" />
                </horizontalAxis>
                <series>
                    <Column3DSeries yField="Profit" displayName="Profit">
                        <showDataEffect>
                            <SeriesInterpolate />
                        </showDataEffect>
                    </Column3DSeries>
                </series>
            </Column3DChart>

            <HttpServiceRepeater url="http://demo.riamore.net/chartTest/singleData.jsp" target="{chart}"
            interval="60"/>
</KoolChart>
```

<Example 35 Example: HttpServiceRepeater with the Column3D Chart>

6.16. Radar Charts

The definition of the Radar chart starts with the <RadarChart> tag and ends with the </RadarChart> tag. The series of the Radar chart is RadarSeries. Two kinds of axes (radialAxis and angularAxis) are used in the Radar chart. The radialAxis corresponds to the radius of the chart. This axis maps numeric data to a distance between the center and the perimeter of the chart. The angularAxis corresponds to the perimeter of the chart and takes values that are categories rather than numerics.

The following examples show the annual household expenditure data in a table format and its array and XML format.

1. Table Format

	2005	2006	2007	2008
Food	100	100	180	150
Health Care	80	120	200	210
Transportation	70	115	100	240
Clothing	80	120	140	210
Education	90	160	130	200
Shelter	100	180	165	140
Leisure	76	120	130	170
Others	80	140	140	190

2. Array Format

```
var chartData = [{"catName":"Food", "year2005":100, "year2006":100, "year2007":180, "year2008":150}
                ,{"catName":"Health Care", "year2005":80, "year2006":120, "year2007":200, "year2008":210}
                ,{"catName":"Transportation", "year2005":70, "year2006":115, "year2007":100,
"year2008":240}
                ,{"catName":"Clothing", "year2005":80, "year2006":120, "year2007":140, "year2008":210}
                ,{"catName":"Education", "year2005":90, "year2006":160, "year2007":130, "year2008":200}
                ,{"catName":"Shelter", "year2005":100, "year2006":180, "year2007":165, "year2008":140}
                ,{"catName":"Leisure", "year2005":76, "year2006":120, "year2007":130, "year2008":170}
                ,{"catName":"Others", "year2005":80, "year2006":140, "year2007":140, "year2008":190}];
```

3. XML Format

```
<items>
        <item>
                <catName>Food</catName>
                <year2005>100</year2005>
                <year2006>100</year2006>
                <year2007>180</year2007>
                <year2008>150</year2008>
        </item>
        <item>
                <catName>Health Care</catName>
                <year2005>80</year2005>
                <year2006>120</year2006>
                <year2007>200</year2007>
                <year2008>210</year2008>
        </item>
          .
          .
          .
        <item>
                <catName>Others</catName>
                <year2005>80</year2005>
                <year2006>140</year2006>
                <year2007>140</year2007>
                <year2008>190</year2008>
        </item>
</items>
```

Based on the above data, the following layout can be created.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
        <Options>
```

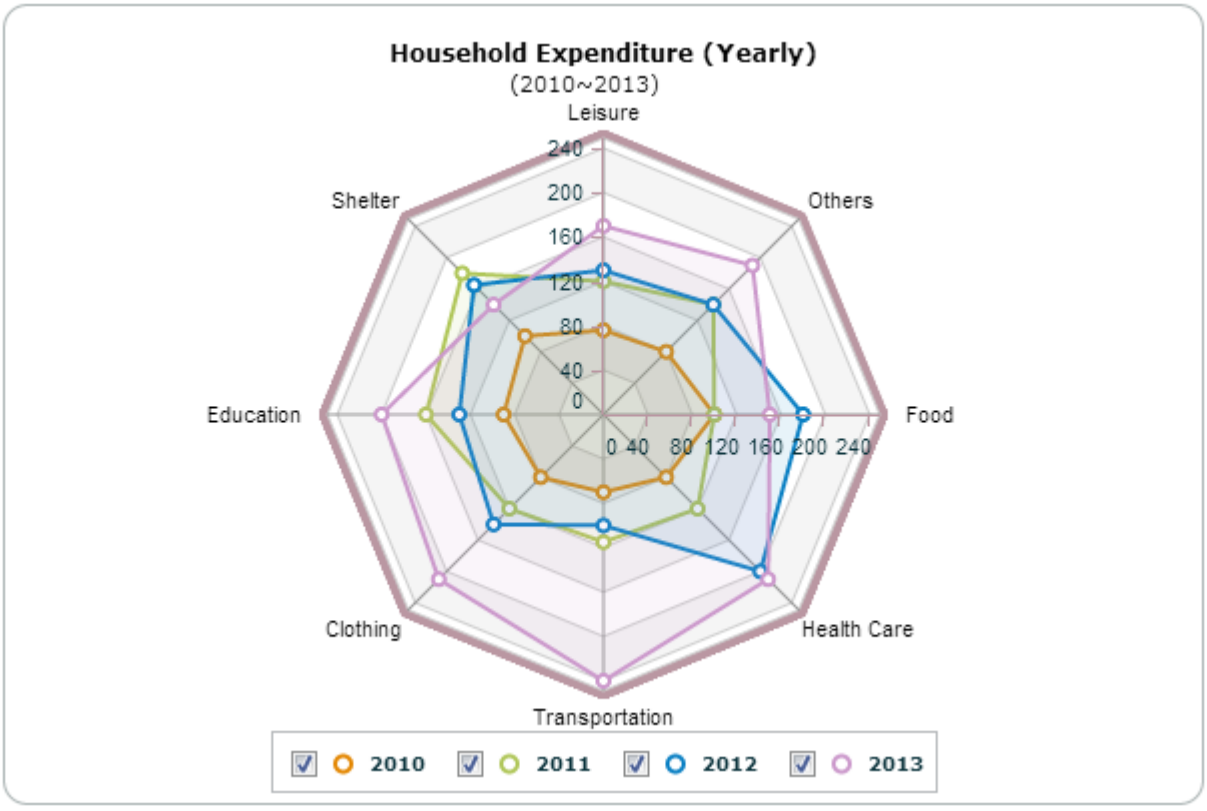
```
                <Caption text="Household Expenditure (Yearly)"/>
                <SubCaption text="(2010~2013)"/>
                <Legend useVisibleCheck="true"/>
        </Options>
        <RadarChart id="chart1"
                    isSeriesOnAxis="false"
                    type="polygon"
                    showAllDataTips="false"
                    showDataTips="true">
                    <radialAxisRenderers>
                        <AxisRenderer horizontal="true" visible="true" styleName="hangingCategoryAxis" >
                        </AxisRenderer>
                        <AxisRenderer horizontal="false" visible="false" styleName="hangingCategoryAxis" >
                        </AxisRenderer>
                    </radialAxisRenderers>
                    <radialAxis>
                        <LinearAxis/>
                    </radialAxis>
                    <angularAxis>
                                        <CategoryAxis id="aAxis" categoryField="catName"
displayName="Category" />
                                </angularAxis>
                    <angularAxisRenderers>
                        <AngularAxisRenderer axis="{aAxis}" axisTitleStyleName="axisTitle"
styleName="hangingCategoryAxis"/>
                    </angularAxisRenderers>
                <series>
                        <RadarSeries field="year2010"
                                displayName="2010">
                                <showDataEffect>
                                        <SeriesInterpolate/>
                                </showDataEffect>
                                <stroke> <!-- Sets the line style of the shape displayed at the data point  -->
                        <Stroke color="0xE48701" weight="2"/>
                                </stroke>
                                <lineStroke> <!-- Sets the line style of the series -->
                                        <Stroke color="0xE48701" weight="2"/>
                                </lineStroke>
                                <areaFill> <!--  Fills the inner space with the color  -->
                                        <SolidColor color="0xE48701" alpha="0.1"/>
                                </areaFill>
                                <fill> <!--  Fills the shape displayed at the data point with the color -->
                                        <SolidColor color="0xFFFFFF"/>
                                </fill>
```

```
</RadarSeries>

<RadarSeries field="year2011"
        displayName="2011">
        <showDataEffect>
                <SeriesInterpolate/>
        </showDataEffect>
        <stroke>
                <Stroke color="0xB0C759" weight="2"/>
        </stroke>
        <lineStroke>
                <Stroke color="0xB0C759" weight="2"/>
        </lineStroke>
        <areaFill>
                <SolidColor color="0xB0C759" alpha="0.1"/>
        </areaFill>
        <fill>
                <SolidColor color="0xFFFFFF"/>
        </fill>
</RadarSeries>
<RadarSeries field="year2012"
        displayName="2012">
        <showDataEffect>
                <SeriesInterpolate/>
        </showDataEffect>
        <stroke>
                <Stroke color="0x0A80C4" weight="2"/>
        </stroke>
        <lineStroke>
                <Stroke color="0x0A80C4" weight="2"/>
        </lineStroke>
        <areaFill>
                <SolidColor color="0x0A80C4" alpha="0.1"/>
        </areaFill>
        <fill>
                <SolidColor color="0xFFFFFF"/>
        </fill>
</RadarSeries>
<RadarSeries field="year2013"
        displayName="2013">
        <showDataEffect>
                <SeriesInterpolate/>
        </showDataEffect>
        <stroke>
```

```
                        <Stroke color="0xCC99CC" weight="2"/>
                    </stroke>
                    <lineStroke>
                        <Stroke color="0xCC99CC" weight="2"/>
                    </lineStroke>
                    <areaFill>
                        <SolidColor color="0xCC99CC" alpha="0.1"/>
                    </areaFill>
                    <fill>
                        <SolidColor color="0xFFFFFF"/>
                    </fill>
                </RadarSeries>
            </series>
        </RadarChart>
</KoolChart>
```

<*Example 36 Example: Radar Chart*>

The following is the output produced by the layout and data above.



<*Figure 21 Output: Radar Chart*>

6.17. Target vs Actual Charts

The Target vs Actual chart displays the target and actual data at the same time in the chart. It has the 2D linear type and the 3D cylinder type. The definition of the 2D linear type starts with <Combination2Dchart> and ends with <Combination2Dchart/>. For the 3D cylinder type, it starts with <Combination3Dchart> and ends with <Combination3Dchart/>. Only two types of series, the series for the target and the series for the actual, can be used for Target vs Actual charts.

The properties of the Target vs Actual chart are the same as those of the Cartesian chart. Please refer to <Table 6 Properties: Cartesian Chart>.

Keep in mind that you should define the series of the actual first and then define the series of the target.

	2D Linear Type	3D Cylinder Type	3D Cylinder-Bar Type
Chart	Combination2DChart	Combination3DChart	Combination3DChart
Series for Actual	Target2DResultSeries	Target3DResultSeries	HTarget3DResultSeries
Series for Target	Target2DGoalSeries	Target3DGoalSeries	HTarget3DResultSeries

<Table 10 Node Names of the Target vs Actual Chart>

The following is an example layout for the 2D Target vs Actual chart.

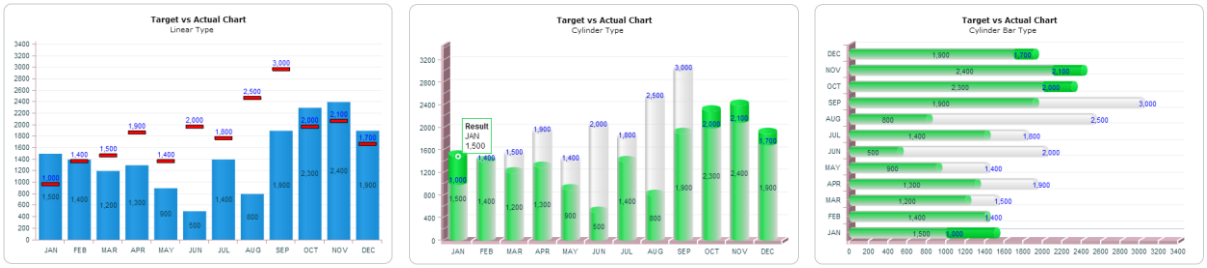
```
<KoolChart backgroundColor="0xFFFFEE"  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Target vs Actual Chart"/>
                <SubCaption text="Linear Type"/>
        </Options>
        <Combination2DChart showDataTips="true">
                <horizontalAxis>
                        <CategoryAxis categoryField="Month" />
                </horizontalAxis>
                <series>
                        <!-- The actual series should be defined first -->
                        <Target2DResultSeries yField="Result" displayName="Result">
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                        </Target2DResultSeries>
                        <!-- The target series -->
                        <Target2DGoalSeries yField="Goal" displayName="Goal">
                                <showDataEffect>
                                        <SeriesInterpolate />
```

```
                                    </showDataEffect>
                                </Target2DGoalSeries>


                            </series>
                        </Combination2DChart>
</KoolChart>
```

<Example 37 Example: 2D Target vs Actual Chart>

You can create the 3D Target vs Actual chart from the above example by changing Combination2DChart, Target2DResultSeries and Target2DResultSeries to Combination3DChart, Target3DResultSeries and Target3DResultSeries respectively.

The following shows the outputs of the Target vs Actual chart



<Figure 22 Outputs: Target vs Actual Chart>

6.18. Scroll Charts

The Scroll charts are useful when the chart has too many data to show but has a little space. Instead of accommodating all dadta in the constrained space, you can use the Scroll chart to increase the space and dispay the data better. It displays a specified number of items in the chart and by scrolling with the mouse it displays the rest of the items.

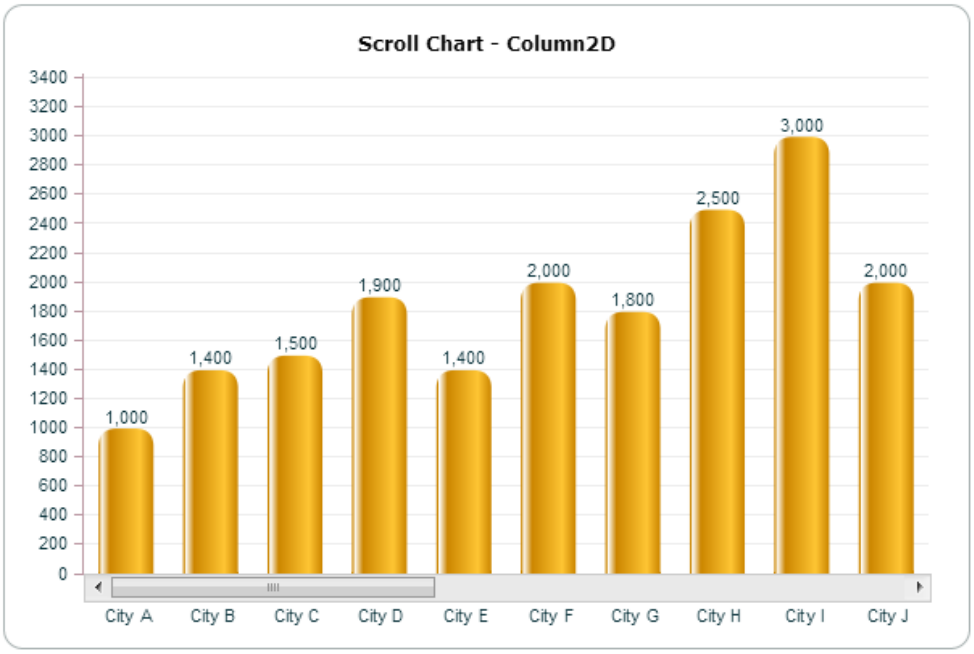
As CategoryLinearAxis is inherited from LinearAxis, you can use all the properties of LinearAxis in CategoryLinearAxis. To create a Scroll chart, follow the steps below.

- Create a 2D chart layout, for example, the Column 2D chart.
- As the Column chart needs to be scrolled horizontally, set CategoryLinearAxis as a child node of the horizontalAxis node (the verticalAxis node for the Bar chart).
- Set ScrollableAxisRenderer as a child node of the horizontalAxisRenderers node.

The scrollbar is created as a style of CSS. The image files for the scrollbar are located in the Assets directory.

```
<KoolChart backgroundColor="0xFFFFEE"   cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Scroll Chart – Column 2D"/>
        </Options>
        <Column2DChart showDataTips="true" gutterRight="10">
            <series>
                <Column2DSeries id="cs1" yField="Data1" displayName="Data1" itemRenderer="
SemiCircleColumnItemRenderer"/>
            </series>
            <horizontalAxis>
                <CategoryLinearAxis id="hAxis" categoryField="Gu"/>
            </horizontalAxis>
            <horizontalAxisRenderers>
                <ScrollableAxisRenderer axis="{hAxis}" visibleItemSize="10" scrollSensitivity="10"/>
            </horizontalAxisRenderers>
        </Column2DChart>
</KoolChart>
```

<Example 38 Example: Scroll 2D Column Chart>



<Figure 23 Output: Scroll 2D Column Chart>

- Scroll Images for CSS

```
<style>
/* For the scrollbar DIV */
```

```
.KoolChart__ScrollBar {
	border : 1px solid #78CBDF;
}

/* For the horizontal track DIV */
.KoolChart__HScrollTrack {
	background : url('./Assets/h_scroll_track.png') repeat-x;
}

/* For the thumb DIV */
.KoolChart__HScrollThumb {
	background:url('./Assets/h_scroll_thumb.png') repeat-x;
	border : 1px solid #78CBDF;
	cursor : pointer;
}

/* For the thumb - hover DIV */
.KoolChart__HScrollThumb:hover{
	background:url('./Assets/h_scroll_thumb_hover.png') repeat-x;
}

/* For the thumb - line DIV */
.KoolChart__HScrollThumbHeader{
	background:url('./Assets/h_scroll_line.png') no-repeat;
}

/* For the right (or up) arrow DIV */
.KoolChart__HScrollUpArrow {
	background:url('./Assets/right_scroll_arrow.png') no-repeat;
	cursor : pointer;
}

/* For the left (or down) arrow DIV */
.KoolChart__HScrollDownArrow {
	background:url('./Assets/left_scroll_arrow.png') no-repeat;
	cursor : pointer;
}
```

```
/* For the vertical track DIV */
.KoolChart__VScrollTrack {
	background : url('./Assets/v_scroll_track.png') repeat-y;
}

.KoolChart__VScrollThumb {
	background:url('./Assets/v_scroll_thumb.png') repeat-y;
	border : 1px solid #78CBDF;
	cursor : pointer;
}

.KoolChart__VScrollThumb:hover{
	background:url('./Assets/v_scroll_thumb_hover.png') repeat-y;
}

.KoolChart__VScrollThumbHeader{
	background:url('./Assets/v_scroll_line.png') no-repeat;
}

.KoolChart__VScrollUpArrow {
	background:url('./Assets/up_scroll_arrow.png') no-repeat;
	cursor : pointer;
}

.KoolChart__VScrollDownArrow {
	background:url('./Assets/down_scroll_arrow.png') no-repeat;
	cursor : pointer;
}
</style>
```

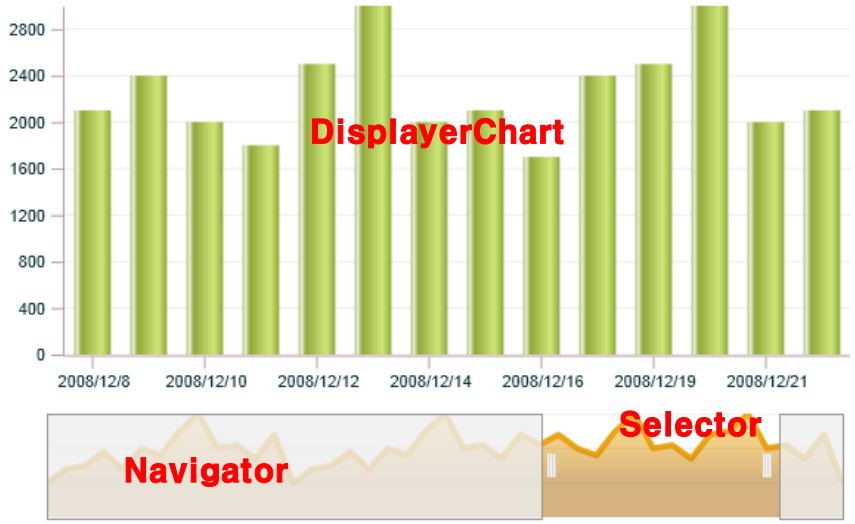
6.19. History Charts

The History chart has the same characteristics as the Scroll chart. But the difference between the two charts is that the History chart scrolls through the navigator (or overview). The navigator allows users to control the number of items displayed in the chart dynamically. The definition of the History chart starts with <HistoryChart> and ends with <HistoryChart/>. The History chart is composed of three different parts, displayer, navigator and selector.

- DisplayerChart
  It displays the selected items you want to display in the chart. You can select items you want to see through Navigator.

- Navigator
  It displays the overview of the entire items.

- Selector
  It displays the selected area of Navigator. The items in the selected area are displayed in Displayer.



<Figure 24 Three Parts of the History Chart>

The following table shows the properties of the History chart.

Properties	Values	Descriptions
displayerChart	Displayer	Defines the displayerChart of the History chart.
navigator	Navigator	Defines the navigator.
selector	HistoryRangeSelector	Defines the selector.

<Table 11 Properties: History Chart>

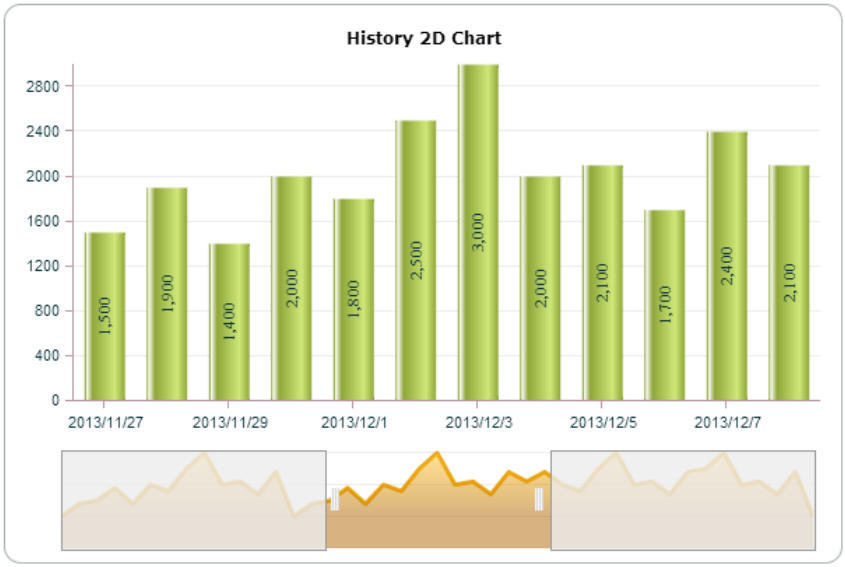
Displayer and Navigator are valid values for displayerChart and navigator. They are only available to HistoryChart. Displayer has all the properties of the Cartesian chart and Navigator has all the properties of the Area2D chart.

The following is a layout of the History chart.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
    <Options>
        <Caption text="History 2D Chart"/>
    </Options>
    <HistoryChart>
        <displayerChart> <!-- Sets displayerChart -->
            <Displayer id="chart1" showDataTips="true" width="100%" height="100%">
                <horizontalAxis>
                    <CategoryAxis id="mainHAxis" categoryField="Date"/>
                </horizontalAxis>
                <series>
                    <Column2DSeries id="columnSeries"
                        yField="Data1" fill="0xB0C759"
                        displayName="Data1">
                        <showDataEffect>
                            <SeriesInterpolate duration="1000"/>
                        </showDataEffect>
                    </Column2DSeries>
                 </series>
            </Displayer>
        </displayerChart>
        <navigator>
            <Navigator id="navi"   width="100%" height="100">
                <horizontalAxis>
                    <CategoryAxis categoryField="Date" id="naviHAxis"/>
                </horizontalAxis>
                <horizontalAxisRenderers>
                    <AxisRenderer axis="{naviHAxis}" visible="false"/>
                </horizontalAxisRenderers>
                <verticalAxis>
                 <LinearAxis id="vAxis"/>
                </verticalAxis>
                <verticalAxisRenderers>
                 <AxisRenderer axis="{vAxis}" visible="false"/>
                </verticalAxisRenderers>
                        <backgroundElements>
                 <GridLines direction="horizontal"/>
                </backgroundElements>
                    <series>
                    <Area2DSeries name="A" yField="Data1"/>
                </series>
            </Navigator>
        </navigator>
```

```
        <selector><!-- Displays 30% of the center of the total data when the initial rendering is finished. -->
                <HistoryRangeSelector width="100%" startingRange="center" visibleItemSize="30"/>
        </selector>
    </HistoryChart>
</KoolChart>
```

<*Example 39 Example: History Chart*>



<*Figure 25 Output: History Chart*>

- The thumb of the navigator is created as a style of CSS.

```
<style>
/* For the thumb of the navigator */
.KoolChart__ChartRangeSelector_Thumb {
        background:url('./Assets/selector.png') no-repeat;
}
</style>
```

6.20. From-To Charts

The From-To chart displays the data area by using the start point and the end point. The Waterfall chart and the Step chart can be created from the From-To chart. The column series (Column2DSeries, Column3DSeries), bar series (Bar2DSeries, Bar3DSeries) and area series (Area2DSeries) are used as the series of the From-To chart. The *minField* property is added for the start point and all the other properties of the From-To chart are the same as those of the Column, Bar and Area chart.

Now we will create a Waterfill chart by using a Column chart. The following is the array form of the numeric data.

```
var data= [
            {"cat":"Jan", "from":1000, "to":5000},
           {"cat":"Feb", "from":5000, "to":12000},
           {"cat":"Mar", "from":12000, "to":16000},
           {"cat":"Apr","from":16000, "to":10000},
            {"cat":"May", "from":10000, "to":100},
            {"cat":"Jun", "from":100, "to":-1000},
            {"cat":"Jul", "from":-1000, "to":3000},
            {"cat":"Aug", "from":3000, "to":8000},
            {"cat":"Sep", "from":8000, "to":12000},
            {"cat":"Oct", "from":12000, "to":14000},
            {"cat":"Nov", "from":14000, "to":7500},
            {"cat":"Dec", "from":7500, "to":2500},
            {"cat":"Next Year", "from":0, "to":20000}
            ];
```

<Example 40 Example: Data of the From-To Chart>

The above data represents the revenue variance of the year. The following is the layout to create the Waterfill chart with the above data.

```
<KoolChart backgroundColor='0xFFFFEE'  cornerRadius='12' borderStyle='solid'>
        <Options>
                <Caption text='2013 Revenue Variation (Monthly)'/>
                <SubCaption text='Unit: Thousand Dollars' textAlign='right' fontSize='11' paddingRight='20'/>
        </Options>
        <NumberFormatter id='fmt'/>
        <Column2DChart showDataTips='true' dataTipJsFunction='dataTipFunc' fontSize='11'>
                <horizontalAxis>
                        <CategoryAxis categoryField='cat'/>
                </horizontalAxis>
                <verticalAxis>
                        <LinearAxis formatter='{fmt}'/>
                </verticalAxis>
                <series>
                        <Column2DSeries id='series1' minField='from' yField='to' fillJsFunction='fillFunc'
itemRenderer='net.riamore.rmate.charts.renderers.BoxItemRenderer'>
                                <showDataEffect>
```

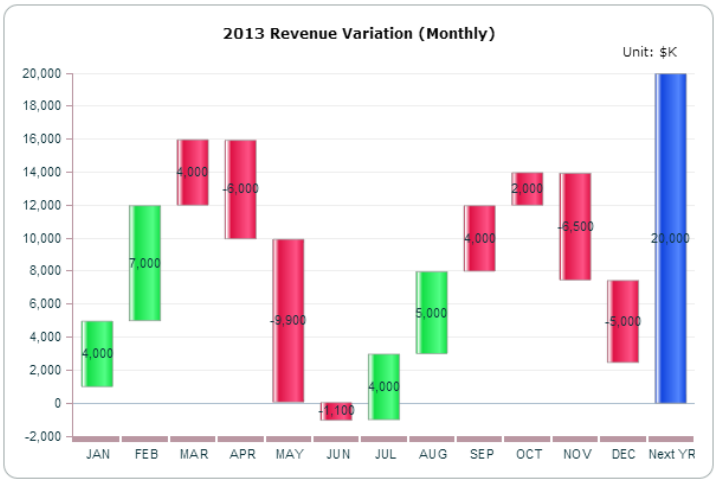
```
                    <SeriesSlide direction='up' duration='1000'/>
                </showDataEffect>
                <stroke>
                    <Stroke weight='1' color='0x999999' alpha='0.7'/>
                </stroke>
            </Column2DSeries>
        </series>
    </Column2DChart>
</KoolChart>
```

<*Example 41 Example: Layout of the From-To Chart*>

As shown in the layout above, the *minField* property with the value of "from" is added in the Column2DSeries node.

The fillJsFunction and dataTipJsFunction are used to create user-defined tooltips and colors. Please refer to < 7.9 Setting User-Defined Functions> for further information.

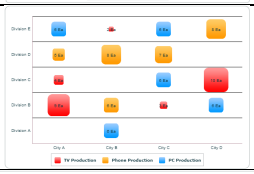
The output of the above layout is as follows:



<*Figure 26 Output: From-To Chart*>

6.21. Matrix Charts

The Matrix chart represents data using images or figures whose position is determined by the X and Y values and the size is determined by the Z value. The types of the Matrix chart are as follows:

Types of the Matrix chart	Descriptions	Outputs
renderer	The position is determined by the X and Y values. The size of the item is determined by the Z value.	
image	The position is determined by the X and Y values. The size of the image is determined by the Z value.	
fill	The position is determined by the X and Y values. The color of the area is determined by the Z value.	
plot	The position is determined by the X and Y values. The type of the plot is determined by the Z value	

<Table 12 Types of the Matrix2D Chart>

The following example shows how to use the *type* property of the Matrix chart.

```
<Matrix2DChart showDataTips="true" type="renderer" selectionMode="single">
```

The following table shows the properties of the Matrix2D chart.

Properties	Values	Descriptions
type	renderer, image, fill, plot (default : renderer)	Defines the data representation of the Matrix2D chart.
drawType	radius, area (default : radius)	Specifies the size criteria of the item. radius: size = 2*πr, area: size = area. (If the value of the type is fill (or plot), the value of drawType will be ignored.)

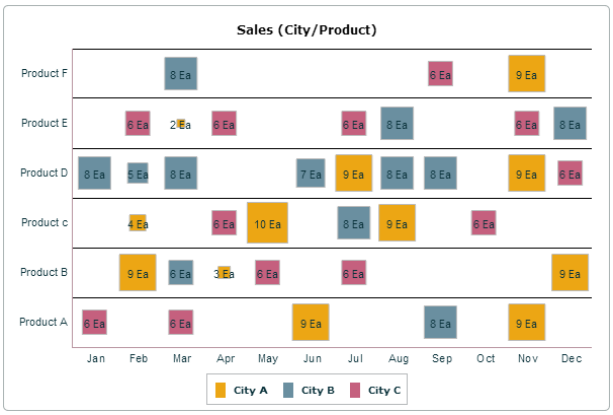
<Table 13 Properties: Matrix2D Chart>

The following example describes how to use the *drawType* property when the type is renderer (or image) in the Matrix2D chart.

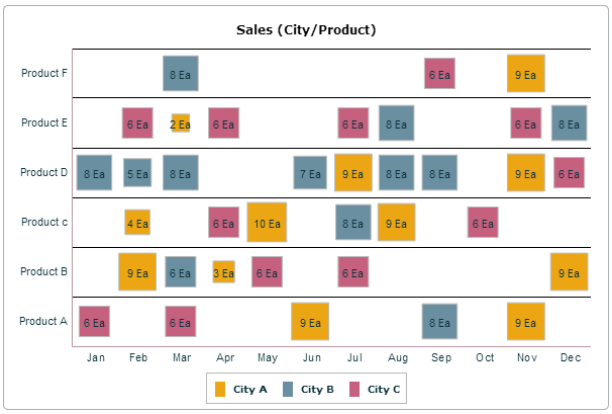
```
<Matrix2DChart showDataTips="true" type="renderer" drawType="radius" selectionMode="single">
```

The following shows the outputs of the Matrix2D chart.

drawType = "radius"



drawType = "area"



If you want to change the shape of the item, you need to set the *renderer* property as follows:

```
<Matrix2DSeries ….. renderer="circle" // renderer="star" …..>
```

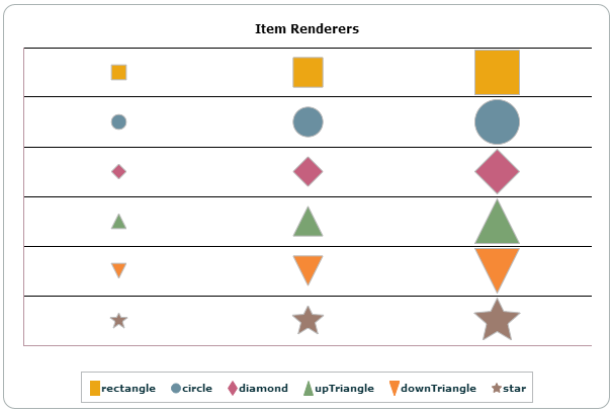
If you want to display images for the items, you need to set the *imageSource* property as follows:

The value of the *imageSource* property should be the URL of the image file.

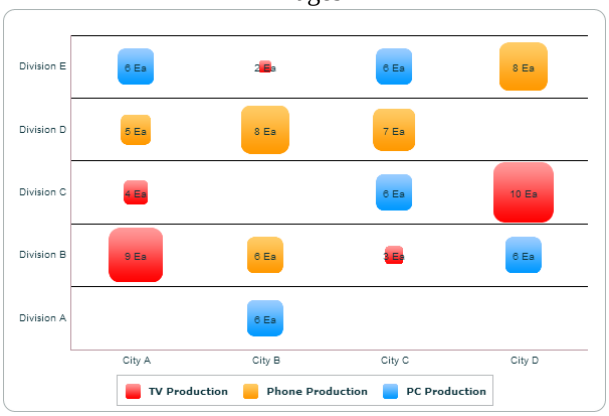
```
<Matrix2DSeries ….. imageSource="./Images/icon1.png" …..>
```

The following shows the outputs of the above examples.

Renderers



Images

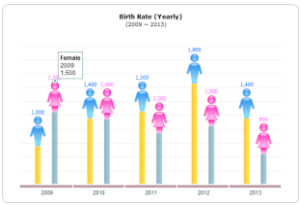
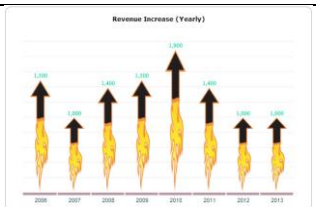


6.22. Image Charts

The Image chart is a kind of the Column chart. It represents data as images whose size is determined by the value of the numeric data. The following factors determine the types of the Image chart:

- First, the aspect ratio of the original image
- Second, whether to use a single image or multiple images to represent the items

The following table describes the types of the Image chart.

Types (imageDisplayType)	Aspect Ratio (true,false)	Descriptions	Samples
single	True	Represents data by using a single image. Uses the same aspect ratio for items. If the extra space remains unused, the space will be filled with a bar.	
	False	Represents data by using a single image. The image size is adjusted automatically (mostly vertical).	

singleRepeat	True	Represents data by using a single image. Uses the same aspect ratio for items. If the extra space remains unused, the space will be filled with the same images.	
	False	n/a	X
multiple	True	n/a	X
	False	Represents data by using multiple images. Each image has a unique value. The size of an image is the unit value.	

<Table 14 Types of the Image Chart>

The *imgSource* property is added for the Image chart and all the other properties of the Image chart are the same as those of the Column chart.

The *imgSource* property determines the path of the image file and how to represent the numeric data as the images

```
<ImageSeries yField="Data1" imageDisplayType="singleRepeat" displayName="Number" styleName="seriesStyle"
formatter="{numFmt}">
    <imgSource>
        <ImageSourceItem url="../Samples/Images/10000.png"/>
    </imgSource>
        <showDataEffect>
            <SeriesSlide duration="1000" direction="up"/>
        </showDataEffect>
</ImageSeries>
```

In the above example, a single image is repeated as the value of imageDisplayType is singleRepeat. The path (URL) of the image file is defined in the ImageSourceItem node. It is a child node of the ImgSource node. The properties of the ImageSourceItem node are as follows:

Properties	Values	Descriptions
maintainAspectRatio	True | false (default: true)	Whether or not the aspect ratio is the same as the original image.

url	The URL of images	The path (URL) of the image file.
Value	Number	Specifies the unit value of each image. (only available to multiple)

<Table 15 Properties: ImageSourceItem Node>

The following is an example layout for the Image chart whose type is multiple and each image has a unique value.

```
<ImageChart id="chart" showDataTips="true" gutterLeft="20" gutterRight="20" showLabelVertically="true">
                    <!--defines the X axis -->
                      <horizontalAxis>
                                <CategoryAxis id="hAxis" categoryField="Region"/>
                      </horizontalAxis>
                    <!--defines the Y axis -->
                      <verticalAxis>
                                <LinearAxis id="vAxis"/>
                      </verticalAxis>
                      <series>
                     <!--Defines the series -->
                      <ImageSeries yField="Data1" imageDisplayType="multiple" styleName="seriesStyle"
formatter="{numFmt}">
                          <imgSource>

                          <!-- The unit value of the first image is 100 -->
                            <ImageSourceItem maintainAspectRatio="false" url="../Samples/Images/3-1.png"
value="100"/>

                          <!--The unit value of the second image is 200 -->
                            <ImageSourceItem maintainAspectRatio="false" url="../Samples/Images/3-2.png"
value="200"/>

                          <!--The unit value of the third image is 300 -->
                            <ImageSourceItem maintainAspectRatio="false" url="../Samples/Images/3-3.png"
value="300"/>

                          </imgSource>
                      </ImageSeries>
                      </series>
                      <horizontalAxisRenderers>
                                <AxisRenderer axis="{hAxis}" fontSize="11"/>
                      </horizontalAxisRenderers>
              <-- visible="fasle" for the Y axis -->
                      <verticalAxisRenderers>
                                <AxisRenderer axis="{vAxis}" visible="false" includeInLayout="false"/>
```

```
            </verticalAxisRenderers>
        </ImageChart>
```

The output of the above layout is as follows:

<Figure 27 Output: Image Chart>

6.23. Real-Time Premium Charts

The Real-time premium chart is the advanced version of the Real-time chart, <6.15 Real-Time Charts>. Like the Real-time chart, it uses HTTPService and RPC for data communication. The unique features of the Real-time premium chart are as follows:

1. You can use different data refresh cycles for each series. For example, if you have 3 series, you can set 10 seconds for the first one and 5 seconds for the second one and 1 minute for the third one.
2. The Real-time chart displays the data from right to left based on the unit (time or amount of data) but the Real-time premium chart displays the data from left to right based on the time defined by servers. The cycle of each series of the Real-time premium chart is different as each series can have the different time unit to display the data on the chart.
3. If the initial data of the Real-time chart need to be displayed in a client browser, they will be displayed as soon as the chart-loading is finished.
4. DateTimeAxis should be defined for the X-axis in the Real-time premium chart. The Real-time premium chart does not support CategoryAxis.

Unlike the Real-time chart, the definition of the Real-time premium chart does not start with <RealTimeChart>. You can create the Real-time premium chart for any type of KoolChart by defining the HttpMultiServiceRepeater node in the layout. The HttpMultiServiceRepeater node has the properties of RPC for each series.

The following table describes the properties of the HttpMultiServiceRepeater node.

Properties	Values	Descriptions
baseURL	URL	Specifies the base URL for the *url* property of RPCItem. (full path = baseURL + url of RPCItem)
method	get | post (default: get)	Specifies the HTTP method.
requestTimeout	Second	The maximum waiting time for the request.
targetController	Chart ID	Specifies the controller of the target of RPCItem. (It should be the chart.)
showErrorMessage	true|false (default: true)	Whether or not to show the error message box when RPC error occurrs.

<Table 16 Properties: HttpMultiServiceRepeater Node>

The following table describes the properties of the RPCItem node.

Properties	Values	Descriptions
name	String	Specifies the name of RPCItem.
url	String	Specifies the url of RPCItem. (full path = baseURL + url of RPCItem)
method	get | post (default: get)	Specifies the HTTP method.
target	Series ID	Specifies the ID of the data series received from the RPC request. Each RPCItem is a series.
interval	Seconds	Specifies the interval of the RPC requests. The first RPC request is sent when the initial chart loading is finished. If the value of interval is not specified, the request will not be sent periodically.
concurrency	multiple | single | last (default: multiple)	Specifies how to handle the duplicated HTTP requests. multiple: Sends all requests without cancelling the previous requests. single: Sends one request at a time. If the duplicated requests occur, the error message will be generated. last: Cancels all the previous requests and sends the last request

retryCount	Number (default: 30)	Specifies the retry count, when RPC error occurs.

<Table 17 Properties: RPCItem Node>

The following example shows how to create a Real-time premium chart by using a Combination 2D chart.

```
<KoolChart backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Real-time chart - different cycle data"/>
                <SubCaption text="Random data is used" textAlign="right" fontSize="11"/>
                <Legend fontSize="11" useVisibleCheck="true"/>
        </Options>

        // Defines the formatters
        <DateFormatter id="dateOrgFmt" formatString="YYYY/MM/DD HH:NN:SS"/>
        <DateFormatter id="dateFmt" formatString="HH:NN:SS"/>
        <DateFormatter id="dateFmt2" formatString="HH:NN"/>
        <NumberFormatter id="numFmt"/>

// Creates the Combination 2D chart with one column series and two line series
        <Combination2DChart id="chart" showDataTips="true" dataTipMode="multiple">
                <series>

                        <!-- Line series with 5 seconds cycle  -->
                        <Line2DSeries id="lineSeries" xField="date" yField="data5"  displayName="Data(5
Sec)">
                                <lineStroke>
                                        <Stroke color="0xFF6666" weight="2" alpha="1"/>
                                </lineStroke>
                                <horizontalAxis>
                                        <DateTimeAxis id="hAxis2" displayLocalTime="true"
labelUnits="minutes" dataUnits="seconds" interval="1" formatter="{dateOrgFmt}" displayName="Time"/>
                                </horizontalAxis>
                                <verticalAxis>
                                        <LinearAxis id="vAxis2" minimum="0" maximum="150"/>
                                </verticalAxis>
                        </Line2DSeries>

                        <!-- Line series with 3 seconds cycle -->
                        <Line2DSeries id="lineSeries2" xField="date" yField="data3" displayName="Data(3 Sec)"
verticalAxis="{vAxis2}" horizontalAxis="{hAxis2}">
                                <lineStroke>
                                        <Stroke color="0x339966" weight="1" alpha="1"/>
                                </lineStroke>
```

```
                    </Line2DSeries>

                    <!-- Defines the accumulated sum-->
                    <Column2DSeries id="columnSeries" xField="date" yField="data60"
displayName="Accumulated sum" itemRenderer="BoxItemRenderer">
                        <horizontalAxis>
                            <DateTimeAxis id="hAxis" displayLocalTime="true"
labelUnits="hours" dataUnits="minutes" interval="3" dataInterval="10" formatter="{dateOrgFmt}"
displayName="Time"/>
                        </horizontalAxis>
                        <verticalAxis>
                            <LinearAxis id="vAxis" minimum="0" maximum="999"/>
                        </verticalAxis>
                        <fill>
                            <SolidColor color="0x6666FF"/>
                        </fill>
                    </Column2DSeries>

                </series>

                <horizontalAxisRenderers>
                    <AxisRenderer axis="{hAxis}" placement="bottom" formatter="{dateFmt2}"
tickLength="30" minorTickLength="0" tickPlacement="inside" showLine="false">
                        <axisStroke>
                            <Stroke weight="1" color="0x999999"/>
                        </axisStroke>
                        <tickStroke>
                            <Stroke weight="1" color="0x6666FF" alpha="0.5"/>
                        </tickStroke>
                    </AxisRenderer>
                    <AxisRenderer axis="{hAxis2}" placement="bottom" formatter="{dateFmt}">
                        <axisStroke>
                            <Stroke weight="1" color="0x999999"/>
                        </axisStroke>
                    </AxisRenderer>
                </horizontalAxisRenderers>

                <verticalAxisRenderers>
                    <AxisRenderer axis="{vAxis}" placement="right" formatter="{numFmt}"/>
                    <AxisRenderer axis="{vAxis2}" placement="left" formatter="{numFmt}"/>
                </verticalAxisRenderers>
            </Combination2DChart>
```

```
// Defines HttpMultiServiceRepeater for a Real-time premium chart.
        <HttpMultiServiceRepeater baseURL="http://demo.riamore.net/realtimeSample/" targetController="{chart}"
requestTimeout="30">
                <RPCList>
                        <RPCItem name="rpc1" url="data3Interval.jsp" target="{lineSeries2}" interval="3"
concurrency="last" retryCount="30"/>
                        <RPCItem name="rpc2" url="data5Interval.jsp" target="{lineSeries}" interval="5"
concurrency="last" retryCount="30"/>
                        <RPCItem name="rpc3" url="data23ToCurrent2.jsp" target="{columnSeries}"
interval="600" concurrency="last" retryCount="30"/>
                </RPCList>
        </HttpMultiServiceRepeater>
</KoolChart>
```

<Example 42 Example: Real-time Premium Chart>

The above sample layout generates a Real-time premium chart which has two line series and one column series and their intervals are 3 seconds, 5 seconds and 10 minutes repectively. The RPC request scenario is that the first RPC request is sent after the initial chart-loading is finished and then the next RPC request is sent at the interval specified for each series. In this example, two line series have no initial data and the column series has the initial data. It displays data after the initial loading for 10 minutes then it refreshes the chart with the new data based on the interval of each series for the next 10 minutes. The accumulated sum for 10 minutes is displayed as a column.

You can see the examples of the server-side scripts for each case. Please see the following folder of the installation CD.

root of CD(or ZIP file)/Samples/RealtimeServerSamples/

The following is the descriptions of the server-side scripts for the above example.

The server-side example of the Real-time premium chart.

http://demo.riamore.net/realtimeSample/hourDataToday.jsp

The descriptions of how it works

// The data in this example is based on arbitrary random data.
requestAllData = true, generates data every 5 seconds from "hour:00" until "hour:minute".
requestAllData = false, generates only one data corresponing to the time "hour:minute".
As the value of the *interval* property of RPCItem is 5, the chart receives data from the server every 5 seconds and adds the newly received data to the existing data.
At the time when <nextInitDate>, all data will be deleted and requested again. (refresh)

Copy the following URLs into your browser and try to print out.

http:demo.riamore.net/realtimeSample/hourDataToday.jsp?requestAllData=true

http:demo.riamore.net/realtimeSample/hourDataToday.jsp?requestAllData=false

---

The descriptions of the parameters.

---

requestAllData: Whether or not the chart requests all data.
This parameter is used to determine the data-refresh time.
If the value of requestAllData is true, RPC occurrs when the following conditions are met.

1. When the initial loading is finished, the first RPC request occurrs.
2. At the time when <nextInitDate>.

If "requestAllData=true", you should set the value of the *isInitData* property in the infoMsg node to true at the server side. (<isInitData>true</isInitData>).
If "requestAllData=false", <isInitData>false</isInitData>

index: Indicates the index of the recently received data.
By using the index, you can minimise the duplication of data.
The client chart maintains the index of the last data received from the server. By passing the index as a parameter when the next data request, the server can easily find the next data to send.

dummy: This value is for avoding the cache problem of IE.
It indicates the milliseconds time from 00:00, January 1st, 1970 until the current time. (This time is based on the client time).

XML writing rules.

The following rules must be followed to write the XML sent to the client.

Rule 1. The infoMsg node and its sub-node information must be required.

Rule 2. The data should be enclosed in the item node.

The descriptions of the sample XML.

The data in this example is based on arbitrary random data (not the data from database)

The display results of the XML are different based on the value of requestAllData.

1. requestAllData = false,
   Generates the XML for one data item.
   The newly received data is added to the existing data.

2. requestAllData = true,
   on the initial loading of the chart, The client requests the data from the server with the parameter, "requestAllData=true"
   In this sample, the server will send the cumulative data from the current time, "hour:00" until the time, "hour:minute".
   At the time when <nextInitDate>, the client sends the request again with the parameter, "requestAllData = true".

3. The descriptions of the infoMsg node.

   1) index node
      The index parameter is not used in this example. But this parameter is useful by passing the unique ID of the most recently received index.
      The server can easily find the next data to send by using this parameter.

   2) timeNow node
      It indicates the current time of the server. This parameter is used to determine the data-refresh time.
      If you omit this parameter, the data-refresh time will be determined by comparing the client time with endDate.
      In other words, if you do not set the timeNow node, the refresh time of each client could be different.

   3) isInitData node
      If you have the request with the parameter, "requestAllData = true", you set the value of the isInitData node to true.

   4) startDate node
      The initial time displayed in the chart.
      If you omit this parameter, the chart will display the initial time based on the time of the initial data-loading.

5) endDate node

The last time displayed in the chart.

6) nextInitDate node

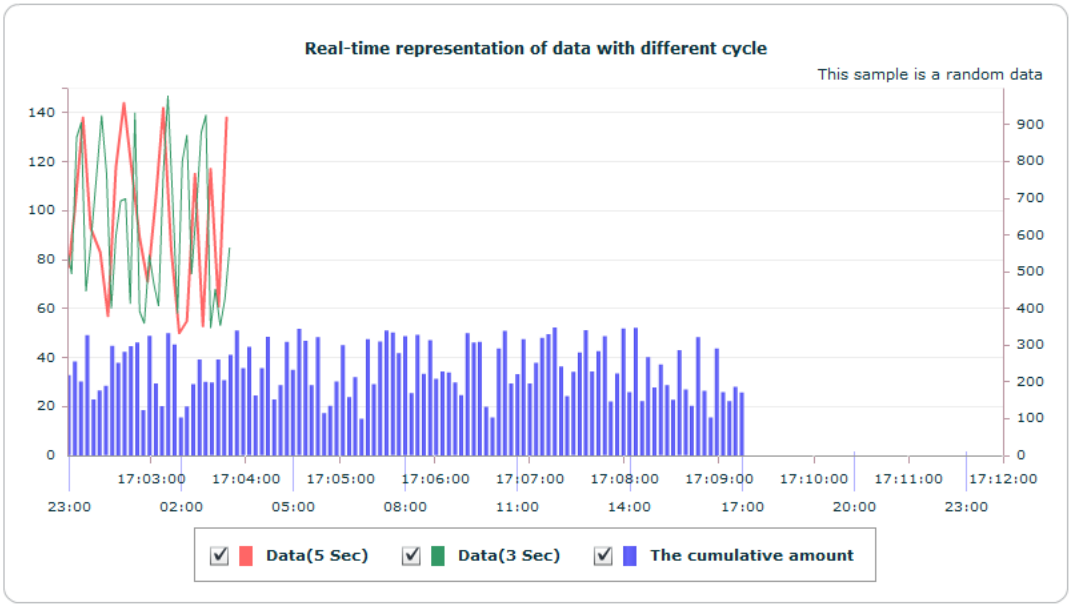
At the time when <nextInitDate>, the data is refreshed. The request is sent with the parameter, "requestAllData=true".

This value is related with the current time and the timeNow node.

For example, If the chart displays the data created one month ago every 10 minutes and it has finished displaying the endDate data at a certain time, the data request will be sent based on this time with the parameter, "requestAllData=true"

<Example 43 Example: Server-Side of the Real-Time Premium Chart>

The following is the output produced by the layout above.



<Figure 28 Output: Real-time Premium Chart>

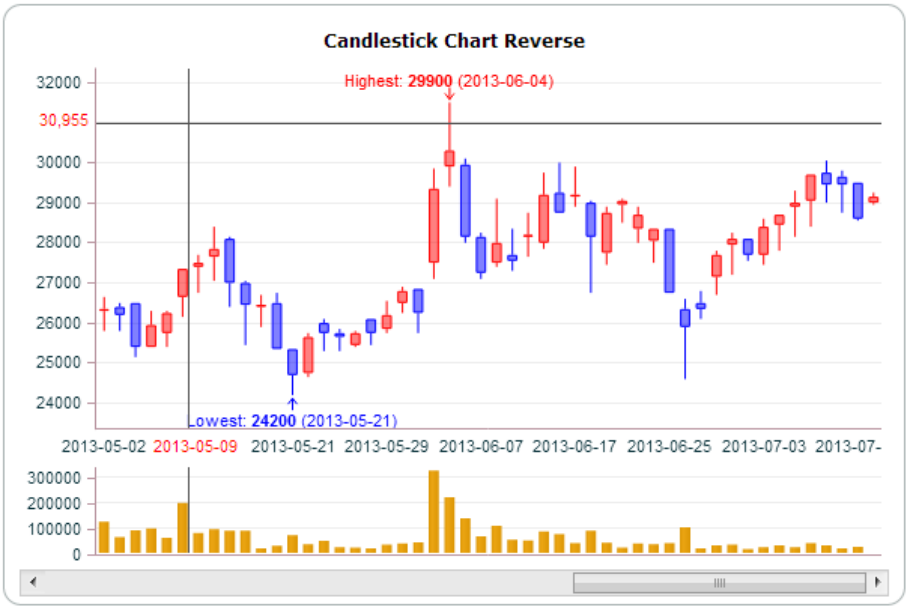
6.24. Candlestick Charts

The candlestick chart in KoolChart is a subset of professional stock charts. You can define a data set that contains open, high, low and close values for each time period you want to display. But functionalities supported by the professional stock chart such as drawing a line or adding a specific symbol at a specific point are not supported by the candlestick chart in KoolChart.

The functionalities supported by the candlestick chart in KoolChart are as follows:

- Showing the maximum and minimum values in the chart.

- Showing the maximum and minimum values set by the user-defined function.
- Showing the disclosure symbol.
- The disclosure symbol can be represented by itemRenderer and special characters or images also can be added by using the div element.
- The disclosure symbol represented by the div element can get the mouse event (click).
- The line color, the outer line color of the bar and the background color of the bar can be set by the open and close values.
- The number of items shown in the chart can be customized.



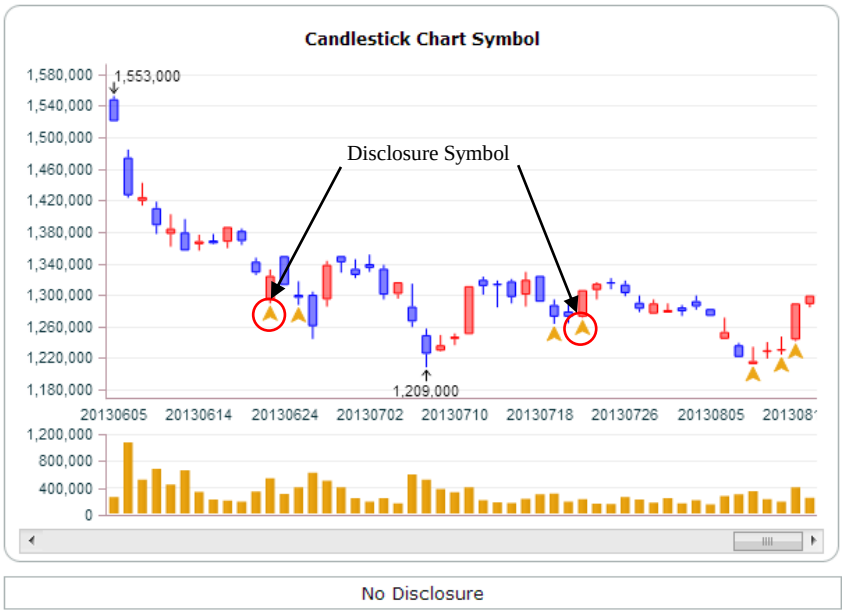
<*Figure 29 Output: Basic Candlestick Chart*>

```
<KoolChart backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text=" Candlestick Chart Reverse"/>
        </Options>
        // Defines the formatter
        <NumberFormatter id="nft" precision="0"/>
        // Sets DualChart
        <DualChart leftGutterSyncEnable="true" rightGutterSyncEnable="true">
        // leftGutterSyncEnalbe - Adjusts the left margin of mainChart and subChart
        // rightGuttersSyncEnable - Adjusts the right margin of mainChart and subChart
                <mainChart>
                        <Candlestick2DChart showDataTips="true" paddingBottom="0">
                                <horizontalAxis>
                                        <CategoryAxis id="hAxis" categoryField="date"/>
                                </horizontalAxis>
                                <verticalAxis>
                                        <LinearAxis baseAtZero="false"/>
```

```
                                        </ verticalAxis>
                                        <series>
// openField - Sets the field name for the opening price.
// showMaxValueLabel - Shows the maximum value of the data points currently displayed in the chart.
// showMinValueLabel - Shows the minimum value of the data points currently displayed in the chart.
                                                <Candlestick2DSeries openField="openprc" closeField="closeprc"
highField="high"   lowField="low" showMinValueLabel="true" showMaxValueLabel="true"
maxLabelJsFunction="maxLabelFunc" minLabelJsFunction="minLabelFunc">
                        // Sets the fill color when the closing price is higher than the opening price.
                                                        <fill>
                                                                <SolidColor color="#ff0000" alpha="0.5"/>
                                                        </fill>
                        // Sets the color of the line connecting the highest price and the lowest price when the closing
price is higher than the opening price.
                                                        <stroke>
                                                                <Stroke color="#ff0000"/>
                                                        </stroke>
                        // Sets the color of the outer line of the bar when the closing price is higher than the opening
price.
                                                        <boxStroke>
                                                                <Stroke color="#ff0000"/>
                                                        </boxStroke>
                        // Sets the fill color for the bar when the opening price is higher than the closing price.
                                                        <declineFill>
                                                                <SolidColor color="#0000ff" alpha="0.5"/>
                                                        </declineFill>
                        // Sets the color of the line connecting the highest price and the lowest price when the opening
price is higher than the closing price.
                                                        <declineStroke>
                                                                <Stroke color="#0000ff"/>
                                                        </declineStroke>
                        // Sets the color of the outer line of the bar when the opening price is higher than the closing
price.
                                                        <declineBoxStroke>
                                                                <Stroke color="#0000ff"/>
                                                        </declineBoxStroke>
                                                </Candlestick2DSeries>
                                        </series/>
                                        <horizontalAxisRenderers>
                                                <Axis2DRenderer placement="bottom" axis="{hAxis}"
tickLength="0"/>
                                        </horizontalAxisRenderers>
                                        <annotationElements>
// syncCrossRangeZoomer - Draws crosshairs in the sub-chart by referencing the id of CrossRangeZoomer and using
```

```
the data in the main chart.
                                        <CrossRangeZoomer id="candleCRZ" enableZooming="false"
syncCrossRangeZoomer="{columnCRZ}" zoomType="both" horizontalLabelFormatter="{nft}"/>
                                    </annotationElements>
                                </Candlestick2DChart>
                        </mainChart>
                        <subChart>
                                <Column2DChart showDatatips="true" height="20%" paddingTop="0"
paddingBottom="0" gutterTop="4">
                                    <horizontalAxis>
                                        <CategoryAxis id="hAxis2" categoryField="date"/>
                                    </horizontalAxis>
                                    <verticalAxis>
                                        <LinearAxis baseAtZero="false"/>
                                    </ verticalAxis>
                                    <series>
                                        <Column2DSeries yField="trdvolume"
itemRenderer="BoxItemRenderer">
                                            <fill>
                                                <SolidColor color="#eca614"/>
                                            </fill>
                                        </Column2DSeries>
                                    </series>
                                    <horizontalAxisRenderers>
                                        <Axis2DRenderer axis="{hAxis2}" showLabels="false"
tickLength="0"/>
                                    </horizontalAxisRenderers>
                                    <annotationElements>
// syncCrossRangeZoomer - Draws crosshairs in the main chart by referencing the id of CrossRangeZoomer and using
the data in the sub-chart.
                                        <CrossRangeZoomer id="columnCRZ" enableZooming="false"
syncCrossRangeZoomer="{candleCRZ}" horizontalLabelFormatter="{nft}" verticalLabelPlacement="top"/>
                                    </annotationElements>
                                </Column2DChart>
                        </subChart>
                        <dataSelector>
                                <DualScrollBar inverted="true" visibleItemSize="50"/>
                        </dataSelector>
                </DualChart>
</KoolChart>
```

<Example 44 Example: Basic Candlestick Chart>



<*Figure 30 Output: Candlestick Chart with Disclosure*>

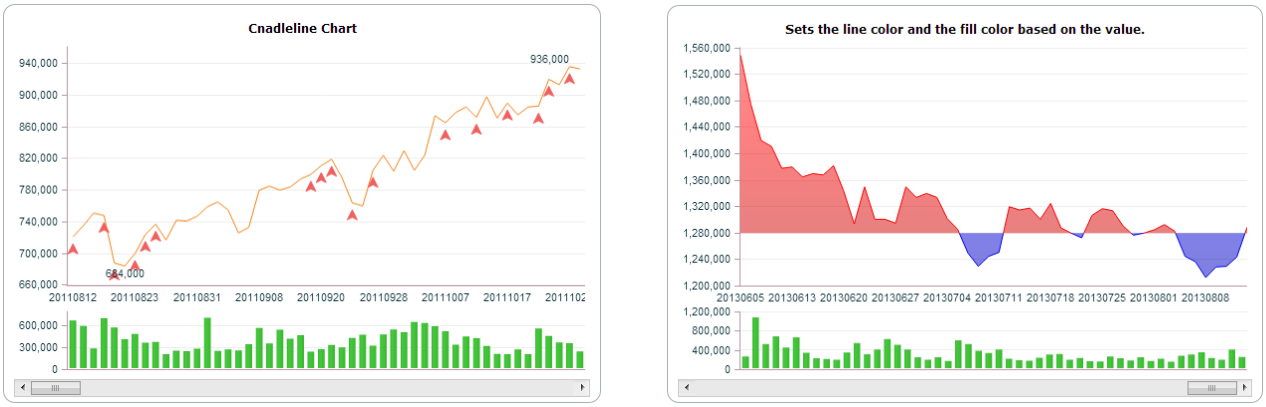
```
<KoolChart backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">
        <Options>
            <Caption text="Riamore CandleChart"/>
        </Options>
        // Defines the formatter
        <NumberFormatter id="nft" precision="0"/>
        // Sets DualChart
        <DualChart leftGutterSyncEnable="true" rightGutterSyncEnable="true">
        // leftGutterSyncEnalbe - Adjusts the left margin of mainChart and subChart
        // rightGuttersSyncEnable - Adjusts the right margin of mainChart and subChart
            <mainChart>
                <Candlestick2DChart showDataTips="true" paddingBottom="0">
                    <horizontalAxis>
                        <CategoryAxis id="hAxis" categoryField="date"/>
                    </horizontalAxis>
                    <verticalAxis>
                        <LinearAxis baseAtZero="false"/>
                    </ verticalAxis>
                    <series>
// openField - Sets the field name for the opening price.
// showMaxValueLabel - Shows the maximum value of the data points currently displayed in the chart.
// showMinValueLabel - Shows the minimum value of the data points currently displayed in the chart.
// symbolField - Sets the field name for the disclosure.
// symbolRenderer - Sets the disclosure symbol.
                        <Candlestick2DSeries openField="openprc" closeField="closeprc"
highField="high"  lowField="low" showMinValueLabel="true" showMaxValueLabel="true"
maxLabelJsFunction="maxLabelFunc" minLabelJsFunction="minLabelFunc" symbolField="disclosure"
```

```
symbolRenderer="UpArrowItemRenderer">
                    // Sets the fill color when the closing price is higher than the opening price.
                                                <fill>
                                                        <SolidColor color="#ff0000" alpha="0.5"/>
                                                </fill>
                    // Sets the color of the line connecting the highest price and the lowest price when the closing
price is higher than the opening price.
                                                <stroke>
                                                        <Stroke color="#ff0000"/>
                                                </stroke>
                    // Sets the color of the outer line of the bar when the closing price is higher than the opening
price.
                                                <boxStroke>
                                                        <Stroke color="#ff0000"/>
                                                </boxStroke>
                    // Sets the fill color for the bar when the opening price is higher than the closing price.
                                                <declineFill>
                                                        <SolidColor color="#0000ff" alpha="0.5"/>
                                                </declineFill>
                    // Sets the color of the line connecting the highest price and the lowest price when the opening
price is higher than the closing price.
                                                <declineStroke>
                                                        <Stroke color="#0000ff"/>
                                                </declineStroke>
                    // Sets the color of the outer line of the bar when the opening price is higher than the closing
price.
                                                <declineBoxStroke>
                                                        <Stroke color="#0000ff"/>
                                                </declineBoxStroke>
                                        </Candlestick2DSeries>
                                </series/>
                                <horizontalAxisRenderers>
                                        <Axis2DRenderer placement="bottom" axis="{hAxis}"
tickLength="0"/>
                                </horizontalAxisRenderers>
                                <annotationElements>
// syncCrossRangeZoomer - Draws crosshairs in the sub-chart by referencing the id of CrossRangeZoomer and using
the data in the main chart.
                                        <CrossRangeZoomer id="candleCRZ" enableZooming="false"
syncCrossRangeZoomer="{columnCRZ}" zoomType="both" horizontalLabelFormatter="{nft}"/>
                                </annotationElements>
                        </Candlestick2DChart>
                </mainChart>
                <subChart>
```

```
                        <Column2DChart showDatatips="true" height="20%" paddingTop="0"
paddingBottom="0" gutterTop="4">
                                <horizontalAxis>
                                        <CategoryAxis id="hAxis2" categoryField="date"/>
                                </horizontalAxis>
                                <verticalAxis>
                                        <LinearAxis baseAtZero="false"/>
                                </ verticalAxis>
                                <series>
                                        <Column2DSeries yField="trdvolume"
itemRenderer="BoxItemRenderer">
                                                <fill>
                                                        <SolidColor color="#eca614"/>
                                                </fill>
                                        </Column2DSeries>
                                </series>
                                <horizontalAxisRenderers>
                                        <Axis2DRenderer axis="{hAxis2}" showLabels="false"
tickLength="0"/>
                                </horizontalAxisRenderers>
                                <annotationElements>
// syncCrossRangeZoomer - Draws crosshairs in the main chart by referencing the id of CrossRangeZoomer and using
the data in the sub-chart.
                                        <CrossRangeZoomer id="columnCRZ" enableZooming="false"
syncCrossRangeZoomer="{candleCRZ}" horizontalLabelFormatter="{nft}" verticalLabelPlacement="top"/>
                                </annotationElements>
                        </Column2DChart>
                </subChart>
                <dataSelector>
                        <DualScrollBar inverted="true" visibleItemSize="50"/>
                </dataSelector>
        </DualChart>
</rMateChart>
```

<Example 45 Example: Candlestick Chart with Disclosure>

In addition to the basic candlestick chart, the candleline and candlearea charts can be created. To create candleline and candlearea chart, you need to define <CandleLine2D> and <CandleArea2D> instead of <Candlestick2D>. The outputs of the candleline and candlearea charts are like as below figures, <Figure 31 Output: Candleline and Candlearea Charts> and please refer to the API document and sample charts for further information.



<Figure 31 Output: Candleline and Candlearea Charts>

6.25. Gauge Charts

6.25.1. Circular Gauge

The definition of the Circular gauge starts with the <CircularGauge> tag and ends with the </CircularGauge> tag. It has a range of 0 to 360 degrees. The default starting angle, 0 degrees, is toward 3 o'clock (or east), and positive angle measurement is clockwise. The Circular gauge is composed of three parts: a background frame, a needle, and a needle cover. You can make various shapes by using the properties of the three parts. The Circular gauge has the default property values but the values of the following properties should be defined by users.

- startAngle
- minimumAngle
- maximumAngle
- value
- minimum
- maximum

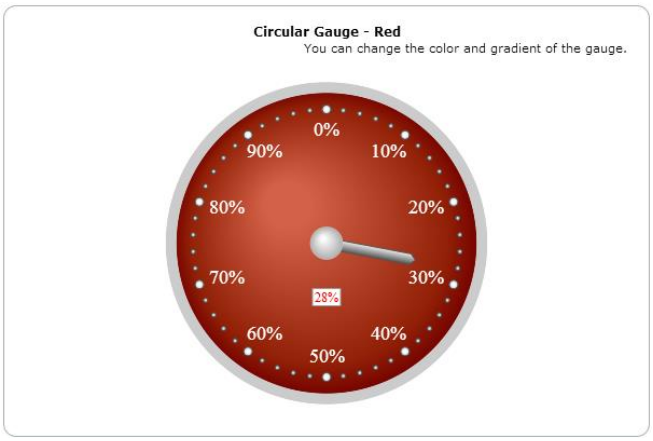
```
<KoolChart backgroundColor="0xEEEEEE" cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text=" Circular Gauge - Red"/>
                <SubCaption text="You can change the color and gradient of the gauge" textAlign="right"
paddingRight="10" fontSize="11" />
        </Options>
        <CurrencyFormatter id="numFmt" precision="0" currencySymbol="%" alignSymbol="right"/>
        <CircularGauge width="300" height="300"   valueChangeFunction="valueChangeFunc"
                                startAngle="270" minimumAngle="0" maximumAngle="360"
                                minimum="0" maximum="100" value="28"
```

```
                    interval="10" minorInterval="2"
                    formatter="{numFmt}"
                    padding="10"
                    labelGap="10"
                    tickLabelStyleName="tickText"
                    valueLabelStyleName="valueText"
                    editMode="true" liveDragging="true"
                    showDataTip="true"
                    tickColor="0xCCCCCC"
                    minorTickColor="0x932108"
                    coverRadiusRatio="0.1"
                    hideTickLabel="first"
                    needleThickness="10"
                    pointThickness="5"
                    needleLengthRatio="0.6"
                    needlePointStyle="steeple"
                    needleBackLengthRatio="0"
                    isValueTop="false"
                    valueYOffset="50">
                <frameStroke>
                    <Stroke color="0xCCCCCC" weight="10"/>
                </frameStroke>
                <frameFill>
                    <SolidColor color="0x932108"/>
                </frameFill>
                <needleFill>
                    <LinearGradient angle="90">
                        <entries>
                            <GradientEntry color="0xEEEEEE" ratio="0" alpha="1"/>
                            <GradientEntry color="0x555555" ratio="1" alpha="1"/>
                        </entries>
                    </LinearGradient>
                </needleFill>
                <needleCoverFill>
                    <RadialGradient>
                        <entries>
                            <GradientEntry color="0xFFFFFF" ratio="0" alpha="1"/>
                            <GradientEntry color="0xB0B0B0" ratio="1" alpha="1"/>
                        </entries>
                    </RadialGradient>
                </needleCoverFill>
    </CircularGauge>
    <Style>
        .valueText {
```

```
                fontSize:12;
                fontFamily:Myriad;
                textAlign:center;
                borderColor:0x999999;
                backgroundColor:0xFFFFFF;
                backgroundAlpha:1;
                paddingTop:2;
                borderThickness:1;
                borderAlpha:1;
                borderStyle:solid;
                color:0xFF0000;
        }
        .tickText {
                fontFamily:Myriad;
                fontSize:18;
                color:0xFFFFFF;
        }
    </Style>
</KoolChart>
```

<Example 46 Example: Circular Gauge>

The following is the output produced by the layout above.



<Figure 32 Output: Circular Gauge>

6.25.2. Half-Circular Gauge

The definition of the Half-Circular gauge starts with the <HalfCircularGauge> tag and ends with the </HalfCircularGauge> tag. The *startAngle* property is not available for the Half-Circular gauge. The initial value of the *minimumAngle* property is 180 degrees (9 o'clock). If the value of the minimumAngle property is smaller than 180, the chart will set the value of minimumAngle to 180 automatically and

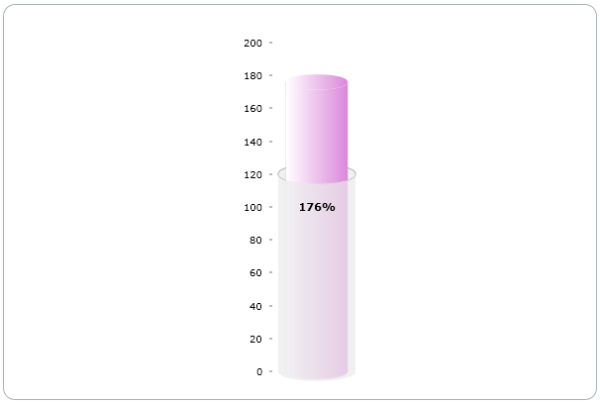
minimumAngle can not be larger than 360. So the range of the Half-Circular gauge is from 9 o'clock to 3 o'clock. And other styles and properties are the same as those of Circular gauge.

6.25.3. Cylinder Gauge

There are two types of the Cylinder gauge: the vertical type and the horizontal type. The Vertical Cylinder gauge starts with <VCylinderGauge> and ends with <VCylinderGauge/> and the Horizontal Cylinder gauge starts with <HCylinderGauge> and ends with <HCylinderGauge/>.
The following is an example layout for the Vertical Cylinder gauge.

```
<KoolChart  backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Gauge"/>
        </Options>
        <VCylinderGauge id="cy1" width="30%" height="180"
                                minimum="0" maximum="160"
                                labels="[0, 20, 40, 60, 80, 100, 120, 140, 160]"
                                value="50"
                                targetMark="150"
                                snapInterval="1"
                                tickThickness="2"
                                tickLength="2"
                                tickInterval="20"
                                liveDragging="true"
                                tickColor="0x000000"
                                valueLabelXOffset="10"
                                valueLabelStylename="valueLabel"
        />
        <Style>
            .valuelabel{
                fontWeight:bold;
             }
        </Style>
</KoolChart>
```

<Example 47 Example: Vertical Cylinder Gauge>



<*Figure 33 Output: Vertical Cylinder Gauge*>

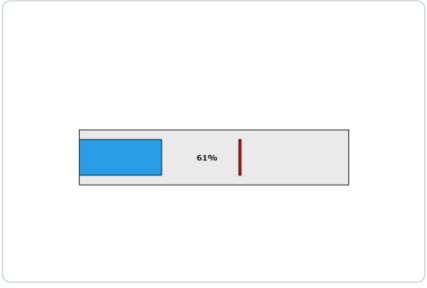
6.25.4. Linear Gauge

There are two types of the Linear gauge, the vertical type and the horizontal types. The Vertical Linear gauge starts with <VLinearGauge> and ends with <VLinearGauge/> and the Horizontal Linear gauge starts with <HLinearGauge> and ends with <HLinearGauge/>.

The following is an example layout for the Horizontal Linear gauge.

```
<KoolChart backgroundColor="0xFFFFFF"  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Gauge"/>
        </Options>
        <HLinearGauge id="hl" width="300" height="100"
                                minimum="0" maximum="100"
                                liveDragging="true"
                                labels="[0, 25, 50, 75, 100]"
                                value="50"
                                targetMark="90"
                                tickThickness="1"
                                tickLength="4"
                                tickInterval="5"
                                snapInterval="1"
                                linearColumnWidth=".6"
                                tickColor="#000000"
                                valueLabelFontWeight="bold"
        />
        <Style>
            .valuelabel {
                fontWeight:bold;
             }
        </Style>
</KoolChart>
```

<*Example 48 Example: Horizontal Linear Gauge*>



<*Figure 34 Output: Horizontal Linear Gauge*>

6.26. Slide Charts

You can use the slide chart as a way of presenting data. After creating several charts regardless of the chart types, you can combine them as a single chart.

The following rules must be followed to create the Slide chart.

1. The layouts for each chart should be added by calling the setSlideLayoutSet() function.
2. The data for each chart should be added by calling the setSlideDataSet() function.

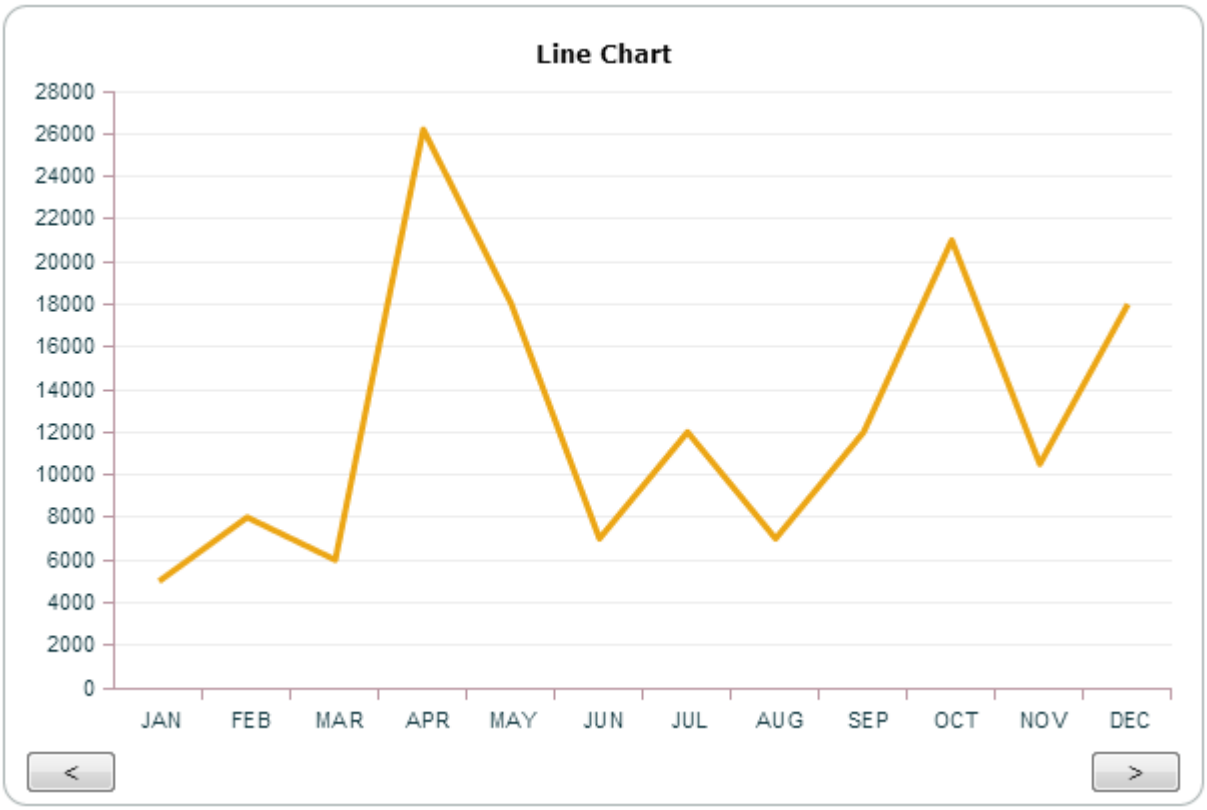
For example, if you want to create a Slide chart which has 5 different chart types, the 5 pairs of the dataset and the layout are required. The type for the layout and the dataset should be Array.

The following is an example layout for the Slide chart.

```
<script language="JavaScript" type="text/javascript">

var chartVars = "KoolOnLoadCallFunction=KoolChartOnLoad";

function KoolChartOnLoad()
{
        var layout1 = getCartesianLayout("Column2D","Column Char ",["Profit"]);
        var layout2 = getCartesianLayout("Line2D","Line Chart",["Profit"]);
        var layout3 = getCartesianLayout("Column3D","Column 3D Chart with Multi Dataset",["Profit","Cost"]);



        // Creating the layouts and the datasets.
        layoutSet = [layout1, layout2, layout3, layout1, layout2];
        dataSet = [chartData, chartData,chartData, chartData, chartData];

        // Adding the layouts.
        document.getElementById("chart").setSlideLayoutSet(layoutSet);

        // Adding the dataset.
        document.getElementById("chart").setSlideDataSet(dataSet);
}

// This function returns the layouts as the string type.
// This function can be customized.
```

```
// Parameters
// type: chart type
// title: caption
// dataField: data field name
function getCartesianLayout(type, title, dataField)
{
	var layout="<KoolChart borderStyle='solid'>"
				+"<Options><Caption text='" + title +"'/></Options>"
				+"<" + type + "Chart showDataTips='true'>"
				+"<series>";

		for(var i=0; i<dataField.length; ++i) {
			layout += "<" + type +"Series yField='" + dataField[i] + "' displayName='" + dataField[i]
+ "'/>"
		}

		layout +="</series>"
				+"<horizontalAxis>"
				+	"<CategoryAxis categoryField='Month'/>"
				+"</horizontalAxis>"
				+"</" + type + "Chart>"
				+"</KoolChart>";
	return layout;
}
// Creating the dataset as an array type
var chartData = [{"Month":"Jan", "Profit":13000},
	{"Month":"Feb", "Profit":12000},
	{"Month":"Mar", "Profit":15000},
	{"Month":"Apr", "Profit":22200},
	{"Month":"May", "Profit":18000},
	{"Month":"Jun", "Profit":15000},
	{"Month":"Jul", "Profit":22000},
	{"Month":"Aug", "Profit":14000},
	{"Month":"Sep", "Profit":26000},
	{"Month":"Oct", "Profit":22000},
	{"Month":"Nov", "Profit":28000},
	{"Month":"Dec", "Profit":34000}];
```

<Example 49 Example: Slide Chart>

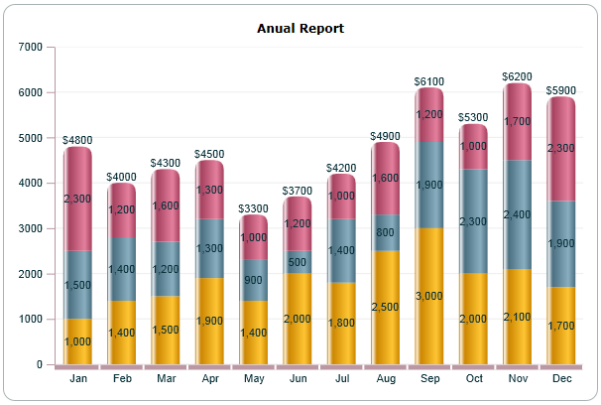


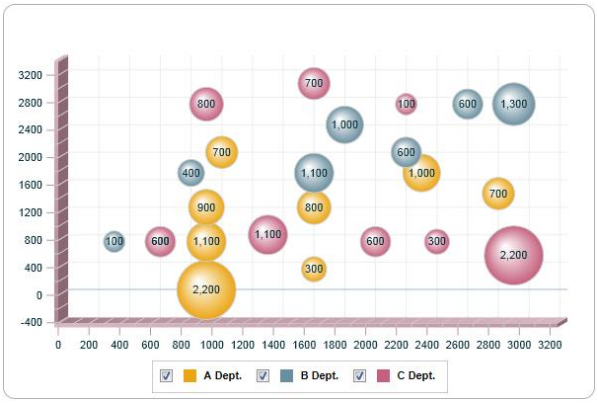
<Figure 35 Output: Slide Chart>

7. Using Layouts for Advanced Users

7.1. Setting Numeric Fields in Charts

You can display the values for each data item as follows:





The *labelPosition* property of the series is used to display the values of data in charts. The valid values of labelPosition are different based on the type of the series. The following table shows the valid values for each series.

Series	Values	Descriptions
ColumnSeries(2D, 3D), BarSeries(2D, 3D), ImageSeries	inside, outside, both, none	Specifies the position at which the lables are displayed.
Line2DSeries, Area2DSeries	up, down, both, none	Specifies the position at which the lables are displayed.
Bubble3DSeries	inside,none	Specifies the position at which the lables are displayed..
PieSeries(2D,3D)	inside, outside, callout, insideWithCallout	Specifies the position at which the lables are displayed. (insideWithCallout: Displays the value of data inside the chart. If the font size of the label is smaller than insideLabelSizeLimit, displays the value outside the chart with the line (callout).)

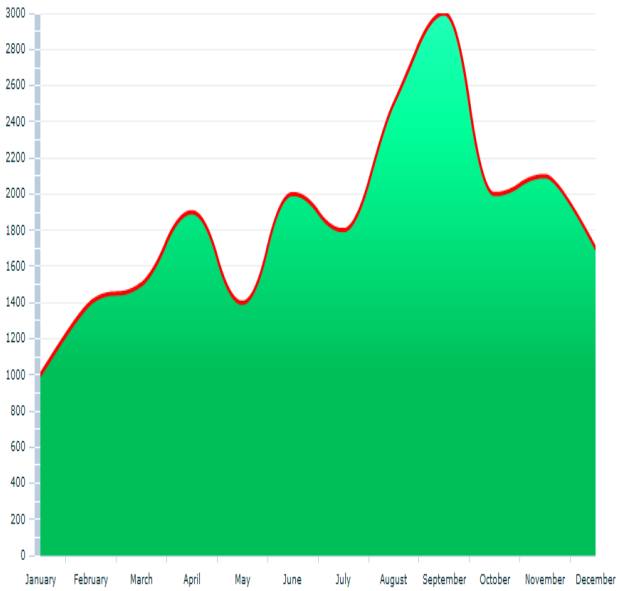
<Table 18 Properties: labelPosition>

7.2. Setting Colors in Series Items

The data item has two types of the color, the line (or stroke) color and the fill color.

```
<series>
   <Area2DSeries yField="Profits"
         form="curve"
         displayName="Profits">

      <areaFill>
            <SolidColor
 color="0x00FF99"/>
     </areaFill>
     <areaStroke>
        <Stroke color="0xFF0000"
weight="3"/>
     </areaStroke>
   </Area2DSeries>
</series>
```

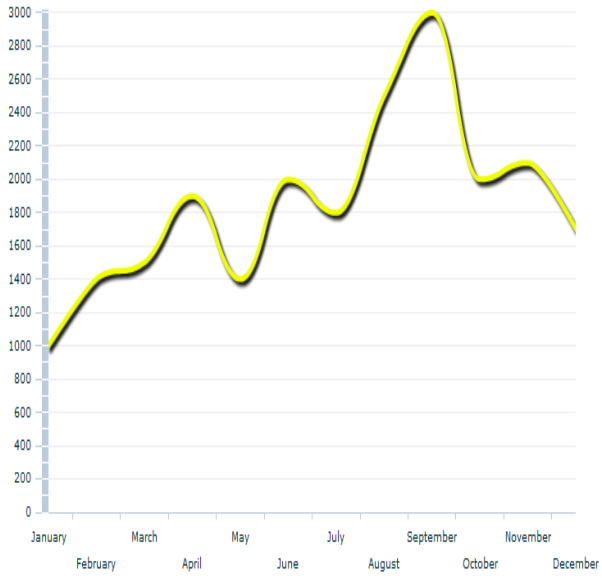
- Important: The property names for the Area chart are areaFill and areaStroke.



<Example 50 Example: Layout and Output of the Area Chart with Fill and Stroke>

```
<Line2DChart>
    <horizontalAxis>
        <CategoryAxis
categoryField="Month"/>
    </horizontalAxis>
    <series>
        <Line2DSeries yField="Profit"
form="curve" displayName="Profit">
            <lineStroke>
                <Stroke color="0xF0FF00"
weight="4"/>
// color: the stroke color.
// weight: the thickness of lines.
            </lineStroke>
        </Line2DSeries>
    </series>
</Line2DChart>
```

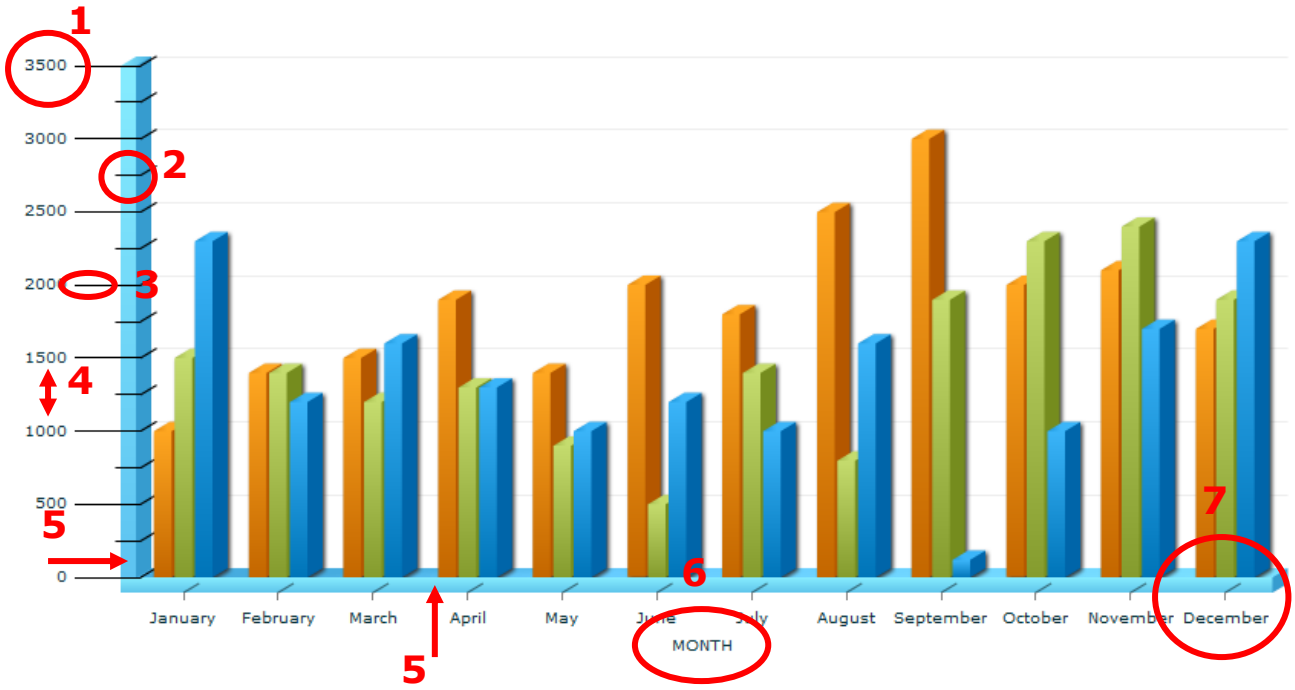
- Important: The property name for the Line chart is lineStroke.



<Example 51 Example: Layout and Output of the Line Chart with Stroke>

7.3. Applying axis styles

7.3.1. About Axis Styles



<Figure 36 Axis Styles>

<Figure 36 Axis Styles> shows an example of a chart that uses an axis style applied to the horizontal and the vertical axes. Each number of the above example indicates:

1. The maximum value of the vertical axis. It is valid only for LinearAixs.
2. It is minorTick. You can define the length of minorTick and the style of the minorTick stroke (the line color, the line thickness, etc).
3. It is tick. You can define the position and the length of the tick and the style of the tick.
4. It is the gap of two consecutive tick values. In the above figure, the gap is 500. It is valid only for LinearAixs.
5. The style of Stroke for the vertical and horizontal axis. In the above figure, the sky-blue color is defined.
6. The title of the horizontal axis.
7. The position of ticks. Ticks can be located between two consecutive labels or at the top of the labels. The above figure shows the example of the ticks positioned at the top of the labels.

The layout for the above example is as follows:

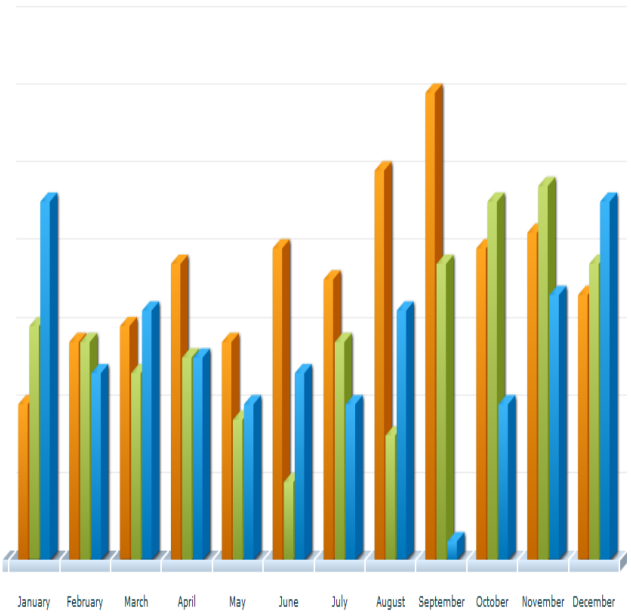
```
<Column3DChart>
    <horizontalAxis>                                                    7
6       <CategoryAxis categoryField="Month" ticksBetweenLabels="false"
```

```
title="MONTH" displayName="Month"/>
        </horizontalAxis>
        <verticalAxis>                                  4                                   1
                <LinearAxis interval="500" baseAtZero="true" maximum="3500"/>
        </verticalAxis>
        <horizontalAxisRenderers>
                <Axis3DRenderer visible="true"
                3       tickLength="5"          2
                        minorTickLength="5"
                        tickPlacement="outside"
                        placement="bottom"
                        canDropLabels="false"
                        showLabels="true"
                        labelAlign="center">
                                                5
                        <axisStroke>
                                <Stroke weight="10" color="0x66CCFF" caps="none"/>
                        </axisStroke>
                        <tickStroke>
                3               <Stroke weight="1" color="0x000000" alpha="0.5" />
                        </tickStroke>
                        <minorTickStroke>       2
                                <Stroke weight="1" color="0x000000" caps="square"/>
                        </minorTickStroke>
                </Axis3DRenderer>
        </horizontalAxisRenderers>

          <verticalAxisRenderers>
                <Axis3DRenderer visible="true"
                        tickLength="30"
                        minorTickLength="3"
                        tickPlacement="left"
                        placement="left"
                        canDropLabels="false"
                        showLabels="true"
                        labelAlign="center">
                        <axisStroke>
                                <Stroke weight="10" color="0x66CCFF" caps="none"/>
                        </axisStroke>
                        <tickStroke>
                                <Stroke weight="1" color="0x000000" />
                        </tickStroke>
                        <minorTickStroke>
                                <Stroke weight="1" color="0x000000" caps="square"/>
                        </minorTickStroke>
                </Axis3DRenderer>
        </verticalAxisRenderers>

        ......

</Column3DChart>
```

<Example 52 Example: Layout for Axis Styles>

7.3.2. Showing and Hiding Axes Using Properties

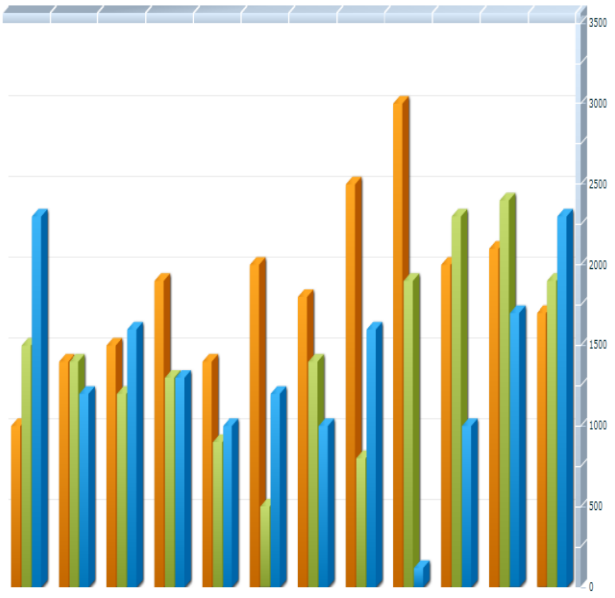
```
<Column3DChart>

        ......


    <horizontalAxisRenderers>
        <Axis3DRenderer
              placement="bottom"
              showLabels="true"
              labelAlign="center">
        </Axis3DRenderer>
    </horizontalAxisRenderers>

    <verticalAxisRenderers>
         <Axis3DRenderer
               visible="false">
         </Axis3DRenderer>
    </verticalAxisRenderers>

        ......

</Column3DChart>
```



<Example 53 Example: Layout and Output to Hide the Vertical Axis>

7.3.3. Changing the Position of Axes

```
<rMateChart>
  <Column3DChart>

        ......

     <horizontalAxisRenderers>
        <Axis3DRenderer
              placement="top"
              showLabels="false">
        </Axis3DRenderer>
     </horizontalAxisRenderers>

     <verticalAxisRenderers>
        <Axis3DRenderer
              placement="right"
              showLabels="true"
              labelAlign="center">
        </Axis3DRenderer>
     </verticalAxisRenderers>

        ......
```

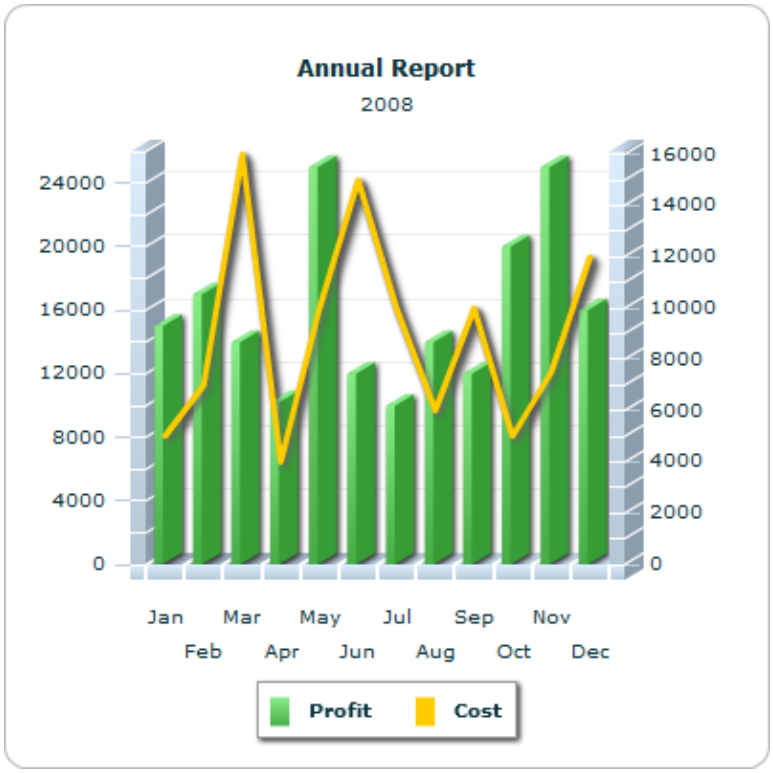


<Example 54 Example: Layout and Output to Change the Position of Axes>

7.3.4. Creating Dual Y-Axes

```
<KoolChart cornerRadius="12" borderStyle="solid">
    <Options>
        <Caption text="Annual Report" />
        <SubCaption text="2008" />
        <Legend />
    </Options>
    <Combination3DChart showDataTips="true">
        <horizontalAxis>
            <CategoryAxis categoryField="Month" />
        </horizontalAxis>
        <verticalAxis>   // Creating a vertical axis for a column series.
            <LinearAxis id="axis1"/>
        </verticalAxis>
        <series>
            <Column3DSeries yField="Profit" displayName="Profit">
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
                <fill>
                    <SolidColor color="0x66CC66" />
                </fill>
            </Column3DSeries>
            <Line2DSeries selectable="true" yField="Cost" displayName="Cost">
                <verticalAxis> // Creating a vertical axis for a line series.
                    <LinearAxis id="axis2"/>
                </verticalAxis>
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
                <lineStroke>
                    <Stroke color="0xFFCC00" weight="3" />
                </lineStroke>
            </Line2DSeries>
        </series>
        <verticalAxisRenderers> // Creating verticalAxisRenderers for each series.
            <Axis3DRenderer axis="{axis1}"/>
            <Axis3DRenderer axis="{axis2}"/>
        </verticalAxisRenderers>
    </Combination3DChart>
</KoolChart>
```

<Example 55 Example: Layout for Two Vertical Axes>

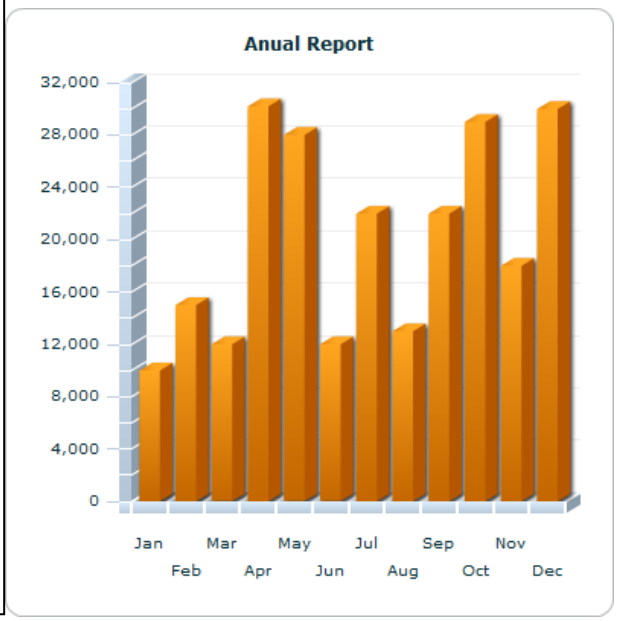


<*Figure 37 Output: Chart with Two Vertical Axes*>

7.3.5. Adding Thousands Separators

The axes defined as LinearAxis represent labels as numeric values. You can use the thousands separator in digit grouping for numeric values. The thousands separator provides a good way to improve the readability of numeric values.

```
<rMateChart cornerRadius="12">
  <Options>
     <Caption text="Anual Report"/>
  </Options>
  <NumberFormatter id="numfmt"
     useThousandsSeparator="true"/>
  <Column3DChart>
    <horizontalAxis>
       <CategoryAxis
          categoryField="Month"/>
    </horizontalAxis>
    <verticalAxis>
      <LinearAxis
           formatter="{numfmt}"/>
    </verticalAxis>
    <series>
       <Column3DSeries yField="Profit"
          displayName="Profit"/>
    </series>
  </Column3DChart>
</rMateChart>
```



<Example 56 Example: Layout and Output to Add the Thousands Separator>

Properties	Values	Descriptions
useThousandsSeparator	True | false (default: true)	Whether or not to add the thousands separator.
useNegativeSign	true | false (default: true)	Indicates how to display the negative sign. If the value of useNegativeSign is true, displays negative values with a leading minus sign; otherwise, negative values are enclosed in parentheses
precision	Number (default: -1)	Specifies the decimal precision. If the value of precision is -1, the precision will be ignored.
thousandsSeparatorTo	Separator (default: comma (,))	Specifies the delimiter as a thousands separator.

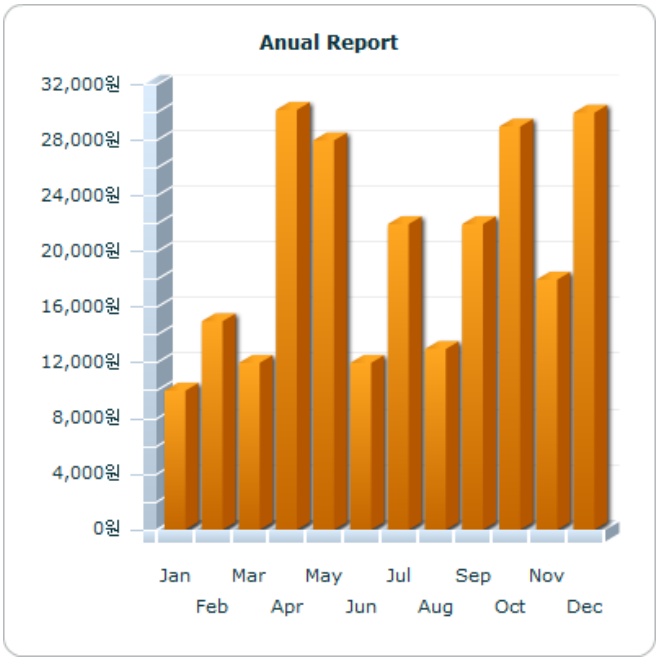
decimalSeparatorTo	Separator (default: dot (.))	Specifies the delimiter as a decimal point.
rounding	down, nearest, up, none (default: none)	Specifies the rounding methods.

<Table 19 Properties: NumberFormatter>

7.3.6. Adding Currency Symbols

You can add a currency symbol in numbers. The following example shows how to add a currency symbol ($) in numbers.

```
<rMateChart>
    <Options>
      <Caption text="Anual Report"/>
    </Options>
    <CurrencyFormatter id="fmt"
           currencySymbol="원"
           alignSymbol="right"/>
    <Column3DChart showDataTips="true"
              fontSize="11">
        <horizontalAxis>
            <CategoryAxis
          categoryField="Month"/>
        </horizontalAxis>
        <verticalAxis>
            <LinearAxis
formatter="{fmt}"/>
        </verticalAxis>
        <series>
            <Column3DSeries
              yField="Profit"/>
        </series>
        </Column3DChart>
</rMateChart>
```



<Example 57 Example: Layout and Output to Add the Currency Symbol>

Properties	Values	Descriptions
currencySymbol	Symbol (default: $)	Specifies the currency symbols.
alignSymbol	left | right (default: left)	Specifies the position of the currency symbol.
useThousandsSeparator	True | false (default: true)	Whether or not to use the thousands separator.

useNegativeSign	true | false (default: true)	Indicates how to display negative values. If the value of useNegativeSign is true, displays negative values with a leading minus sign otherwise, negative values are enclosed in parentheses
precision	Number (default: -1)	Specifies the decimal precision. If the value of precision is -1, the precision will be ignored.
thousandsSeparatorTo	Separator (default: comma (,))	Specifies the delimiter as a thousands separator.
decimalSeparatorTo	Separator (default: dot (.))	Specifies the delimiter as a decimal point.

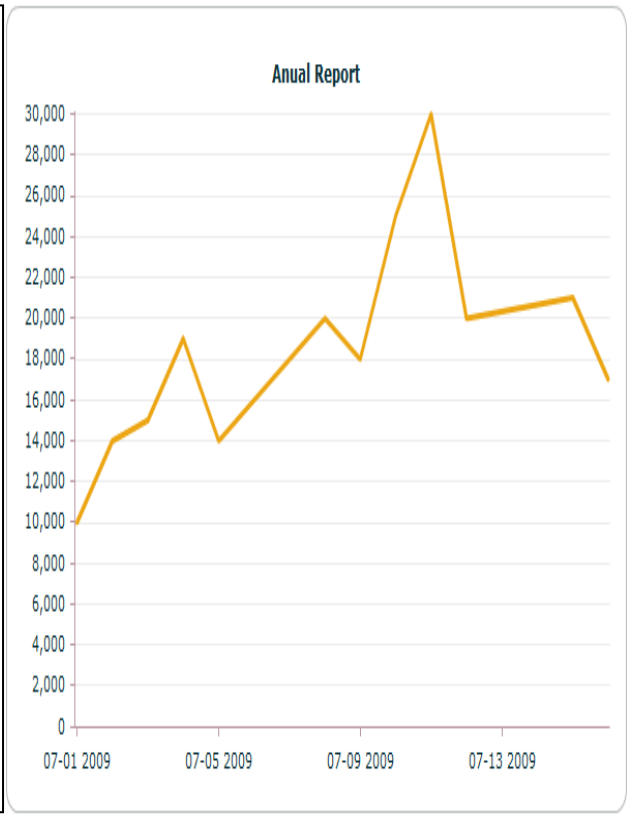
<Table 20 Properties: CurrencyFormatter>

7.3.7. Using Date Formats in DateTimeAxis

If DateTimeAxis is defined for the horizontal axis of the Line chart, the data will be displayed along the horizontal axis by using the date format. For example, if you set the value of labelUnits to "days", the labels will be displayed by using the default date format of your computer (e.g. "MM/DD/YYYY"). You can change the date format of the data by using DateFormatter

The following example shows how to use DateFormatter.

```
<rMateChart>
  <Options>
     <Caption text="Anual Report"/>
  </Options>
  <DateFormatter id="dateFmt"
  formatString="MM-DD YYYY" />
  <NumberFormatter id="curFmt" />
  <Line2DChart showDataTips="true"
  fontSize="11">
    <horizontalAxis>
       <DateTimeAxis dataUnits="days"
       labelUnits="days" interval="4"
       formatter="{dateFmt}"
       alignLabelsToUnits="false"
       displayLocalTime="true" />
    </horizontalAxis>
    <verticalAxis>
      <LinearAxis formatter="{curFmt}"/>
    </verticalAxis>
    <series>
      <Line2DSeries xField="Date"
      yField="Profit"
      displayName="Profit"/>
    </series>
  </Line2DChart>
</rMateChart>
```



<Example 58 Usage Example: DateFormatter>

To change the date format in the axis, define DateFormatter and assign it a unique id. Once DateFormatter is defined with the unique id, you set the *formatter* property of DateTimeAxis to the id.

Note: As the id is a unique object, it should be enclosed in the curly braces. (Please refer to <Example 8 Example: How to Create the Property Value Using the ID>

The following table shows how to use formatString. For example, if you want to display a date string like "2009/12/01", you should specify the pattern string as "YYYY/MM/DD".

Pattern Characters	Descriptions	Examples
Y	Year	YY = 05 YYYY = 2005 YYYYY = 02005
M	Month	M = 7 MM= 07 MMM=Jul MMMM= July
D	Day	D = 4 DD = 04 DD = 10
H	Hour	H = 1 HH = 01
N	Minute	N = 1 NN = 01
S	Second	SS = 30

<Table 21 Descriptions: FormatString>

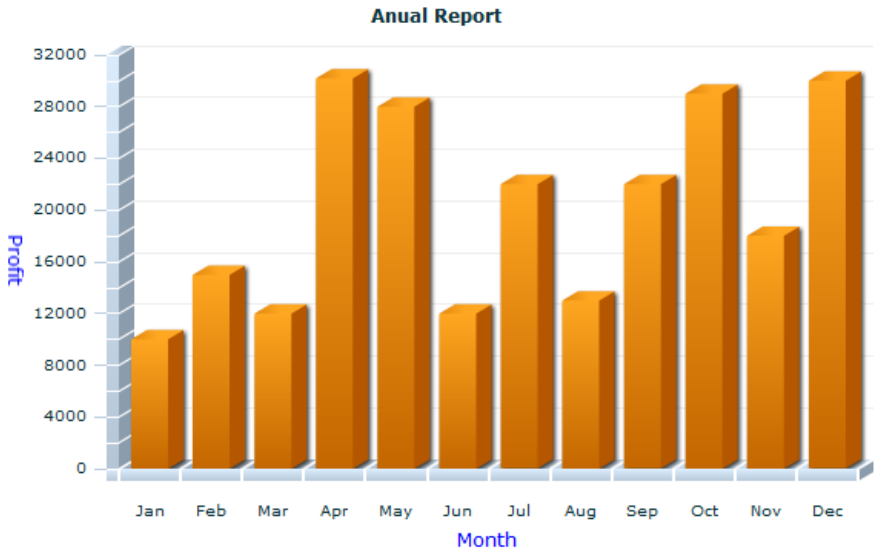
7.3.8. Adding Titles

You can add titles to axes. For Example, you can add "Profit" as a title for the vertical axis and "Month" for the horizontal axis. The following example shows how to add titles.

```
<KoolChart>
        <Options>
                <Caption text="Anual Report"/>
        </Options>
        <Column3DChart showDataTips="true">
        <horizontalAxis>
            <CategoryAxis categoryField="Month" title="Month"/>// "Month" is a title for the horizontal axis
        </horizontalAxis>
        <verticalAxis>
            <LinearAxis title="Profit"/> // "Profit" is a title for the vertical axis
        </verticalAxis>
        <horizontalAxisRenderers>              // horizontalAxisRenderers is defined for styles.
                        <Axis3DRenderer   axisTitleStyleName="title"/>
        </horizontalAxisRenderers>
```

```
        <verticalAxisRenderers>                 // verticalAxisRenderers is defined for styles.
                        <Axis3DRenderer   axisTitleStyleName="title"/>
        </verticalAxisRenderers>
        <series>
            <Column3DSeries yField="Profit"/>
        </series>
    </Column3DChart>
    <Style> // The Style node is defined for the style of axis titles.
        .title
        {
                fontSize:12;
                color:0x0000FF;
                fontWeight:"bold";
        }
    </Style>
</KoolChart>
```

<Example 59 Usage Example: Axis Titles>

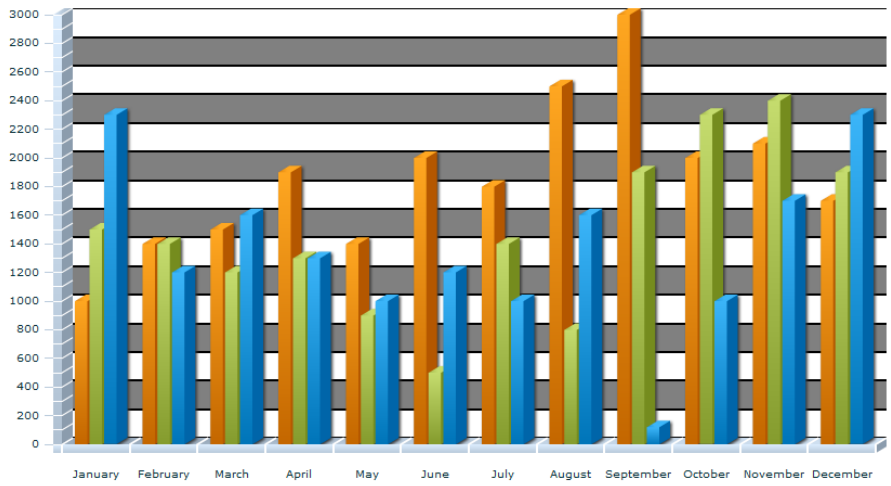


<Figure 38 Output: Chart with Axis Titles>

7.4. Designing Chart Backgrounds

7.4.1. Adding Gridlines

All the charts which have X and Y axes can have backgroundElements. The backgroundElements property can be used to decorate the background area of the chart.



<*Figure 39 Output: backgroundElements*>

In the above example, only horizontal lines are used to decorate the background area. The following options are needed to add horizontal lines in the background.

- direction = "horizontal", "vertical", "both".
- horizontalChangeCount = "1" : Changes colors of each line. The colors of fill and alternateFill are used alternately.
- horizontalStroke: Defines the color of the line between fill and alternateFill.
- horizontalFill: The initial color. In the above example, the color is white.
- horizontalAlternateFill: The alternate color. In the above example, the color is gray.

The following layout shows horizontal lines are added in the background of the chart. If you want to add vertical lines, you should set the value of direction to vertical.

```
<KoolChart>
    <Column3DChart>
        <backgroundElements>
            <GridLines direction="horizontal" verticalChangeCount="1" horizontalChangeCount="1">
                <horizontalStroke>
                    <Stroke color="0x000000" alpha="1" weight="2"/>
                </horizontalStroke>
                <horizontalFill>
                    <SolidColor color="0xffffff" alpha="0.5"/>
                </horizontalFill>
                <horizontalAlternateFill>
                    <SolidColor color="0x000000" alpha="0.5"/>
                </horizontalAlternateFill>
                <verticalStroke>
                    <Stroke color="0x000000" alpha="1" weight="2"/>
                </verticalStroke>
```

```
                        <verticalFill>
                                <SolidColor color="0x00ffff" alpha="0.5"/>
                        </verticalFill>
                        <verticalAlternateFill>
                                <SolidColor color="0x999999" alpha="0.5"/>
                        </verticalAlternateFill>
                </GridLines>
        </backgroundElements>
    </Column3DChart>
</KoolChart>
```

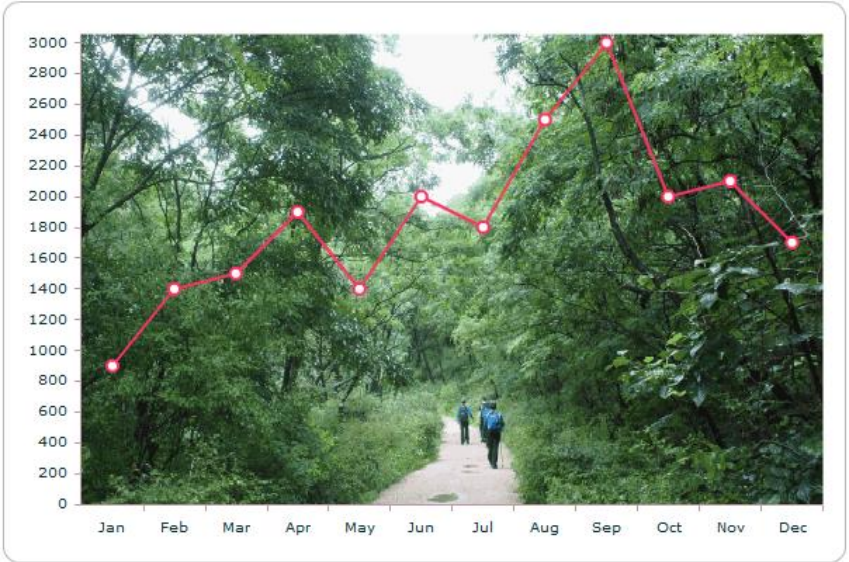
<*Example 60 Example: backgroundElements*>

7.4.2. Adding Images

In order to add images to the background of the chart, you can use backgroundElements or annotationElements. The background elements are displayed in the backgound of the chart and the annotation elements are displayed in the foregound of the chart.
The following example shows how to add an image using backgroundElements.

```
<KoolChart backgroundColor="0xFFFFEE"   cornerRadius="12" borderStyle="solid">
        <Line2DChart showDataTips="true">
                <horizontalAxis>
                        <CategoryAxis categoryField="Month"/>
                </horizontalAxis>
                <series>
                        <Line2DSeries yField='Profit' displayName='Profit'
itemRenderer='mx.charts.renderers.CircleItemRenderer' radius='5'>
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                                <lineStroke><Stroke color='0xFF3366' weight='2'/></lineStroke>
                                <stroke><Stroke color='0xFF3366' weight='2'/></stroke>
                        </Line2DSeries>
                </series>
                <backgroundElements>
                        <Image source="http://www.riamore.net/image/riamoreMain.jpg"
maintainAspectRatio="false" alpha="1"/>
                </backgroundElements>
        </Line2DChart>
</KoolChart>
```

<*Example 61 Example: Adding an Image to the Background*>



<*Figure 40 Output: Adding an Image to the Background*>

The following example shows how to add an image to the foreground of charts.

```
<annotationElements>
                    <Image source="http://www.riamore.net/image/riamoreMain.jpg"
maintainAspectRatio="false" alpha="0.25"/>
</ annotationElements>
```

<*Example 62 Example: Adding an Image to the Foreground*>

If you add an image to the foreground of the chart and set the alpha value (transparency) of the image to 1, the chart will be invisible. To avoid this problem, you need to set the proper value for alpha.

The following table shows the properties of Images.

Properties	Descriptions
source	Specifies the URL of images.
maintainAspectRation	Whether or not the aspect ratio is the same as the original image. If it is true, the chart will try to keep the ratio of images; otherwise, the chart will adjust images to fit the size of the chart
alpha	The transparency of images (Effective value : 0~1)

<*Table 22 Properties: Image*>

7.5. Creating Effects in Charts

KoolChart for HTML5 currently supports the SeriesSlide effect. SeriesInterpolate and SeriesZoom will be supported in the next version.

- SeriesSlide : Slides data series to the left from the right.

The following table shows the properties of the effect.

Properties	Values	Descriptions	Effects
duration	millisecond (default: 500)	Specifies the time required to complete the whole effect.	Common
elementOffset	millisecond (default: 20)	Specifies the delay time of the effect.	
minimumElementDuration	millisecond (default: 0)	Specifies the minimum amount of time which is taken to complete the effect for each element.	
offset	millisecond(default: 0)	Specifies the delay time of the start of the effect.	
perElementOffset	Millisecond	Specifies the delay time of the start of each element.	
direction	left | right | up | down (default: left)	Specifies the direction of the sliding effect.	SeriesSlide
horizontalFocus	center | left | right (default: center)	Specifies the horizontal focal point of the zoom.	SeriesZoom
verticalFocus	center | top | bottom (default: center)	Specifies the vertical focal point of the zoom.	
relativeTo	chart | series (default: chart)	Specifies the boundary of the focal point of the zoom.	

<Table 23 Properties: Effect>

The following example shows how to create the effect using SeriesSlide.

```
<KoolChart>
    <Column3DChart>
        <Column3DSeries yField="Profit">
            <showDataEffect>
                <SeriesSlide duration="1000" // Uses SeriesSlide with specific options.
                    direction="down"
```

```
                    minimumElementDuration="20"
                    perElementOffset="0"
                    elementOffset="30"/>
            </showDataEffect>
        </Column3DSeries>
        <Column3DSeries yField="Cost">
            <showDataEffect>
                < SeriesSlide /> // Uses SeriesSlide with default options.
            </showDataEffect>
        </Column3DSeries>
        ……
        ……
</KoolChart>
```

<Example 63 Example: Effects by Using SeriesSlide>

The effect of the above example runs as follows:

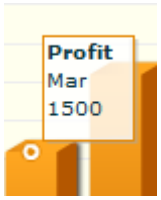
Each element starts its slide after 30 miliseconds of the previous element's slide and the effect takes at least 20 miliseconds to complete its slide. The entire effect takes at least 1 second (1,000 miliseconds) to slide the data series down

7.6. Showing DataTips (ToolTips) on Charts

Showing tooltips on the chart (column, bar, area, and line, etc) is achieved by using DataTips (ToolTips). The tooltip text will be shown when the mouse cursor moves over the chart element. To display tooltips on the chart you should set the value of the *showDataTips* property to "true". The following example shows how to display tooltips when mouseover event occurs in a Column 3D chart. The *showDataTips* property is the common property for all charts.

```
<KoolChart>
        <Options>
            <Caption text="Annual Report"/>
        </Options>
        <Column3DChart showDataTips="true">
            <horizontalAxis>
                <CategoryAxis categoryField="Month" title="Month"/>
              </horizontalAxis>
             <series>
                 <Column3DSeries yField="Profit" displayName="Profit">
```

```
                    <showDataEffect>
                        <SeriesInterpolate/>
                    </showDataEffect>
                </Column3DSeries>

                .....
                .....
```



< Tooltip displayed when mouseover event occurs >

```
</KoolChart>
```

<Example 64 Usage Example: Tooltips>

Once you set the value of showDataTips to "true" and set the value of the *displayName* property of Series to "Profit", you can have the Tooltip text like above example.

7.7. Creating Lines between Stacked DataSets in Column Charts

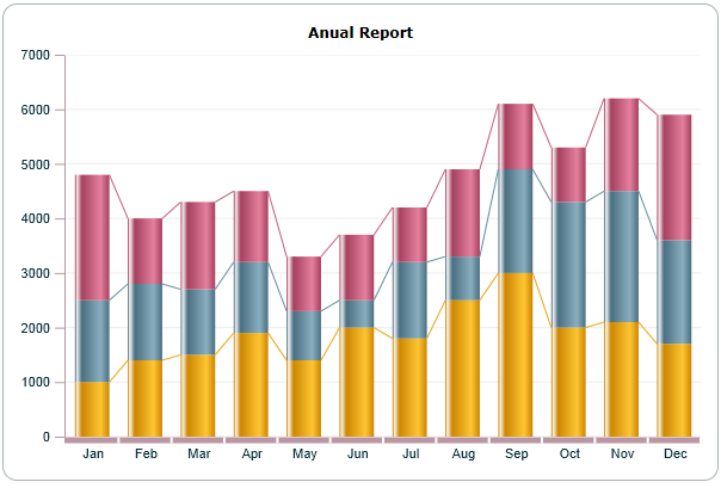
You might want to add some additional lines to connect shapes in the chart in order to indicate an additional reporting relationship. You can add connecting lines to the stacked column chart by setting the value of the *lineToEachItems* property of Column2DSeries (or Column3DSeries) to "true".

alwayShowLines: Indicates whether the line for 0-valued data can be displayed or not.
True - Displays lines for all data including 0-valued data.
False – Displays lines except 0-valued data.

```
<Column2DChart showDataTips="true" type="stacked"> //Defines as a stacked type
        <horizontalAxis>
            <CategoryAxis categoryField="Month" />
        </horizontalAxis>
        <series>                                //Sets the value of lineToEachItems to true
            <Column2DSeries yField="Profit" lineToEachItems="true" alwayShowLines="true">
                <linkLineStroke> //Defines styles of lines
                    <Stroke weight="2" color="0x000000" caps="none" />
                </linkLineStroke>
                <showDataEffect>
                    <SeriesInterpolate />
                </showDataEffect>
            </Column2DSeries>
            <Column2DSeries yField="Cost" lineToEachItems="true" alwayShowLines="true">
                <linkLineStroke>
                    <Stroke weight="2" color="0x000000" caps="none" />
```

```
                    </linkLineStroke>
                    <showDataEffect>
                        <SeriesInterpolate />
                    </showDataEffect>
                </Column2DSeries>
                <Column2DSeries yField="Revenue" lineToEachItems="true" alwayShowLines="true">
                    <linkLineStroke>
                        <Stroke weight="2" color="0x000000" caps="none" />
                    </linkLineStroke>
                    <showDataEffect>
                        <SeriesInterpolate />
                    </showDataEffect>
                </Column2DSeries>
            </series>
</Column2DChart>
```

<*Example 65 Example: Lines between Stacked DataSets*>



<*Figure 41 Output: Chart with Lines between Stacked DataSets*>

7.8. Setting Functions for Click Events on Items

The itemClickJsFunction property enables you to pass information for items to your script whenever you click on the item of the chart. To pass the information of the item to your script, you should create a function to be called when the item is clicked and then set the value of the *itemClickJsFunction* property to the function name. The *itemClickJsFunction* property should be defined in the <Chart> node (ex, <Column3DChart/>, <Bar3DChart/>, etc).

The following example shows how to define itemClickJsFunction in a Pie chart. When a user clicks on a

slice of the Pie chart, a function named chartClick will be called.

```
<KoolChart  cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report" />
        </Options>
        <Pie2DChart showDataTips="true" itemClickJsFunction="chartClick">
                <series>
                        <Pie2DSeries field="Profit" nameField="Month" displayName="Profit">
                                <showDataEffect>
                                        <SeriesInterpolate/>
                                </showDataEffect>
                        </Pie2DSeries>
                </series>
        </Pie2DChart>
</KoolChart>
```

<Example 66 Example: Call Functions>

The following is an example of the chartClick function.

```
<html lang="en">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<script src="KoolChart.js" language="javascript"></script>

<script language="JavaScript" type="text/javascript">

var chartVars;
var layoutURL = encodeURIComponent("chartLayout.xml");
chartVars += "&layoutURL="+layoutURL;

var dataURL =encodeURIComponent("singleData.xml");
chartVars += "&dataURL="+dataURL;

KoolChart.create("chart1", "chartHolder", chartVars, "100%", "100%");


// ------------------ Create the function called when the item is clicked ---------------

/*
// Parameters:
// seriesId: The ID of series in the layout if it is defined.
// displayText: The content of tooltips.
```

```
// index: The index of clicked items. (The index of leftmost or top items is 0.)
// data: The original data of items.
// values : This parameter is passed as an array type data and the elements of the array are determined based on the chart type as follows:
                Bar2D(3D)Series         0: X-axis value, 1: Y-axis value
                Column2D(3D)Series   0: X-axis value, 1: Y-axis value
                Area2DSeries             0: X-axis value, 1: Y-axis value
                Bubble3DSeries          0: X-axis value, 1: Y-axis value 2: radius
                Line2DSeries              0: X-axis value, 1: Y-axis value
                Pie2DSeries                0: value
*/
function chartClick(seriesId, displayText, index, data, values)
{
        alert("seriesId:"+seriesId+"₩ndisplayText:"+displayText+"₩nindex:"+index+"₩ndata:"+data+"₩nvalues:"+values);
}

</script>
</head>

<body>
<div class="content">
        <div id="chartHolder" style="width:600px; height:400px;">
        </div>
</div>
</body>
</html>
```

<Example 67 Example: JavaScript Function Called When Item Click Occurs>

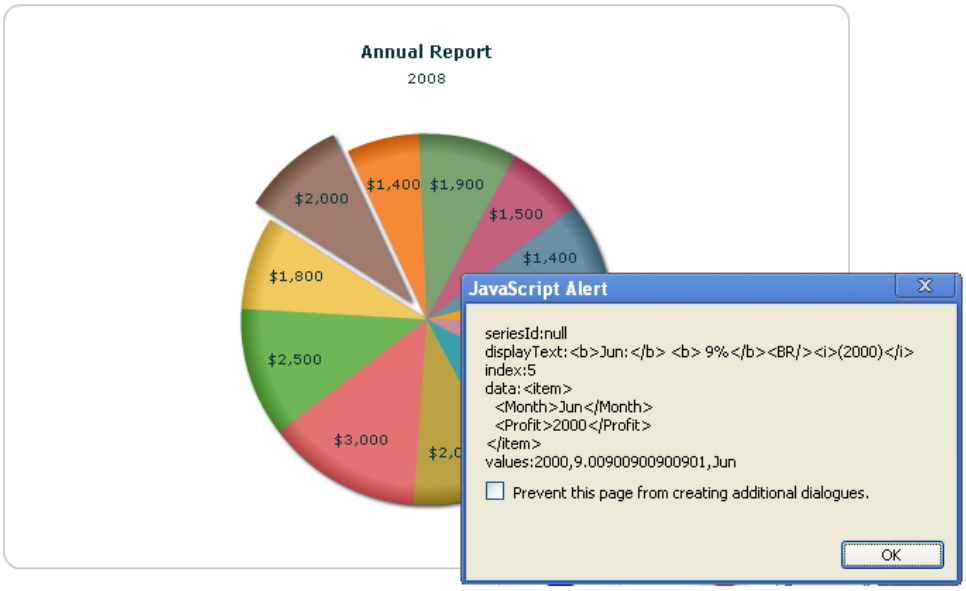
The following table describes the parameters used in the above example.

Parameters	Descriptions
seriesId	The ID of the series in the layout if it is defined.
displayText	The content of tooltips.
index	The index of the clicked item. (The index of the leftmost or the top item is 0.)
data	The original data of the item.

<table>
<tr><td>values</td><td>The value of the item. This parameter is passed as an array type data and the elements of the array are determined based on the chart type as follows:
<table>
<tr><td>Bar2DSeries(Bar3DSeries)</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Column2DSeries(Column3DSeries)</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Area2DSeries</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Bubble3DSeries</td><td>0: X-axis value, 1: Y-axis value 2: radius</td></tr>
<tr><td>Line2DSeries</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Pie2DSeries(Pie3DSeries)</td><td>0: value</td></tr>
</table></td></tr>
</table>

<Table 24 Parameters of the Function Called When Item Click Occurs>

The following is the output produced by the above layout and the function call.



<Figure 42 Output: Function Call When the Item Click Occurs>

7.9. Setting User-Defined Functions

You can use user-defined functions in the following cases.

1. Use of Tooltips
2. Use of Axis labels (axis or axis renderer)
3. Use of numeric data fields for Column, Bar or Pie charts

The user-defined function can be used by creating the JavaScript function and setting the function name

as the value of the corresponding property in the layout. The *Formatter* property cannot be used with the user-defined function for the axis label or numeric data field (except tooltips). If Formatter and labelJsFunction are defined at the same time, the chart will not be generated successfully.

7.9.1. DataTips (ToolTips) Functions

You can create user-defined tooltips using dataTipJsFunction. When the mouseover event occurs, the function defined as the value of dataTipsFunction property is called and then return the string to be shown as the tooltips.

The following example shows how to define dataTipJsFunction

```
<KoolChart backgroundColor="0xFFFFEE"   cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Anual Report"/>
        </Options>
        <Column3DChart showDataTips="true" dataTipJsFunction="dataTipFunc">
                <horizontalAxis>
                        <CategoryAxis categoryField="Month" displayName="Date"/>
                </horizontalAxis>
                <verticalAxis>
                        <LinearAxis displayName="Amount"/>
                </verticalAxis>
                <series>
                        <Column3DSeries id="series1" yField="Profit" displayName="Profit">
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                        </Column3DSeries>
                        <Column3DSeries id="series2" yField="Cost" displayName="Cost">
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                        </Column3DSeries>
                        <Column3DSeries id="series3" yField="Revenue" displayName="Revenue">
                                <showDataEffect>
                                        <SeriesInterpolate />
                                </showDataEffect>
                        </Column3DSeries>
                </series>
        </Column3DChart>
</KoolChart>
```

<Example 68 Usage Example: dataTipJsFunction>

The following example shows the user-defined function defined as the value of dataTipJsFunction.

```
/*
// Parameters:
// seriesId: The ID of the series in the layout if it is defined.
// seriesName: displayName for the series.
// index: The index of the clicked items. (The index of the leftmost item or the top item is 0.)
// xName: If displayName is defined for X-axis, X-axis displayName will be displayed.
// yName: If displayName is defined for Y-axis, Y-axis displayName will be displayed.
// data: The original data of the items.
// values: This parameter is passed as the array-type data and the elements of the array are determined based on the chart type as follows:
                Bar2D(3D)Series         0: X-axis value, 1: Y-axis value
                Column2D(3D)Series   0: X-axis value, 1: Y-axis value
                Area2DSeries              0: X-axis value, 1: Y-axis value
                Bubble3DSeries          0: X-axis value, 1: Y-axis value 2: radius
                Line2DSeries               0: X-axis value, 1: Y-axis value
                Pie2D(3D)Series          0: value, 1: percentage, 2:nameField
*/

// User-defined tooltips.
function dataTipFunc(seriesId, seriesName, index, xName, yName, data, values)
{
        return "<font color='#CC3300'>User-defined data tips</font>₩nseriesId:"+seriesId
                        +"<br/><font color='#0000FF'>Current Data : </font>"
                        +"<b>"+seriesName+"</b>"+"₩nitemIndex:"+index
                        +"<br/><font color='#0000FF'>xDisplayName : </font>"+"<b><font size='11'>"+xName+"</font></b>"
                        +"<br/><font color='#0000FF'>yDisplayName : </font>"+"<b><font size='11'>"+yName+"</font></b>"
                        +"<br/>data:"+data+"<br/>values:"+values;
}
```

<Example 69 Example: JavaScript Function Called for Tooltips>

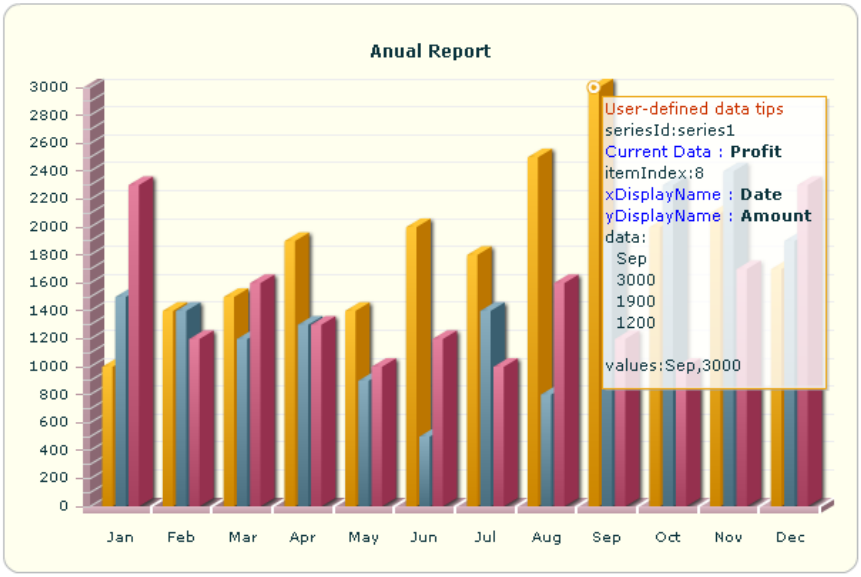
- **HTML tags can be used for user-defined tooltips.**

The following table describes the parameters used in the above example.

Parameters	Descriptions
seriesId	The ID of the series in the layout if it is defined.
seriesName	The displayName for the series.
index	The index of the clicked items. (The index of leftmost or top items is 0).
xName	If displayName is defined for X-axis, X-axis displayName will be displayed.

<table>
<tr><td>yName</td><td>If displayName is defined for Y-axis, Y-axis displayName will be displayed.</td></tr>
<tr><td>data</td><td>The original data of the items.</td></tr>
<tr><td>values</td><td>The value of the items. This parameter is passed as an array type and the elements of the array are determined based on the chart type as follows:
<table>
<tr><td>Bar2DSeries(Bar3DSeries)</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Column2DSeries(Column3DSeries)</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Area2DSeries</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Bubble3DSeries</td><td>0: X-axis value, 1: Y-axis value 2: radius</td></tr>
<tr><td>Line2DSeries</td><td>0: X-axis value, 1: Y-axis value</td></tr>
<tr><td>Pie2DSeries(Pie3DSeries)</td><td>0: value, 1: percentage, 2: nameField</td></tr>
</table></td></tr>
</table>

<Table 25 Parameters: Function Called for Tooltips>



<Figure 43 Output: Function Call for Tooltips>

7.9.2. Axis Labels

You can create user-defined axis labels by using labelJsFunction. To create user-defined axis labels, you create a callback function and then set the value of the *labelJsFunction* property to the function name. You can define labelJsFunction in axes or axis renderers. (The function defined in axes runs first.)

The following example shows how to define labelJsFunction in horizontalAxis.

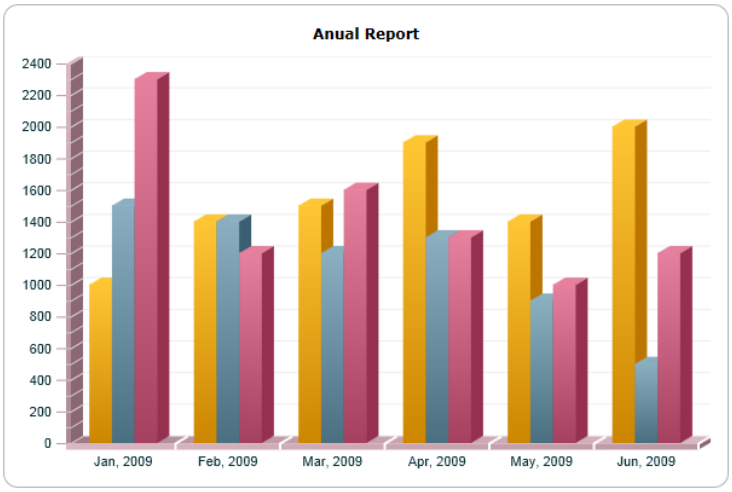
```
<KoolChart backgroundColor="0xFFFFEE"    cornerRadius="12" borderStyle="solid">
        <Options>
```

```
                <Caption text="Anual Report"/>
        </Options>
        <Column3DChart showDataTips="true">
                <horizontalAxis>
                        <!-- axisLabelFunc is the name of JavaScript. -->
                        <CategoryAxis categoryField="Month" displayName="Date"
labelJsFunction="axisLabelFunc"/>
                </horizontalAxis>
                <verticalAxis>
                        <LinearAxis displayName="Amount"/>
                </verticalAxis>
                ...
                ...
                ...
        </Column3DChart>
</KoolChart>
```

<Example 70 Usage Example: labelJsFunction>

```
/*
// ------------------------- A user-defined function for X-axis labels ------------------------------
//
// Parameters:
// id: The ID of axes
// value: The value of items
*/
function axisLabelFunc(id, value)
{
        return   value + ", 2009";
}
```

<Example 71 Example: JavaScript Function Called for Labels>



<Figure 44 Output: Function Call for Labels>

7.9.3. Numeric Fields

If you want to create user-defined numeric data fields in Column, Bar or Pie charts, you need to define labelJsFunction in the series node.

The following example shows how to define labelJsFunction to create user-defined numeric data fields.

```
<series>
        <!-- seriesLabelFunc is the name of JavaScript function -->
        <Column2DSeries yField="Profit" displayName="Profit" labelPosition="outside" styleName="seriesStyle"
outsideLabelJsFunction="seriesLabelFunc">
                <showDataEffect>
                        <SeriesInterpolate/>
                </showDataEffect>
        </Column2DSeries>
</series>
```

<Example 72 Usage Example: labelJsFunction for Numeric Data Fields>

The following example shows the user-defined function (seriesLabelFunc) set for numeric data fields.

```
/*
// A user-defined function for numeric data fields.
//
// Parameters
// seriesId: The corresponding series ID
// index: The index of the corresponding item
// data: The original data of the items
// values: The value of the items. This parameter is passed as the array-type data and the elements of the array are
```

```
determined based on the chart type as follows:
                Bar2D(3D)Series         0: X-axis value, 1: Y-axis value
                Column2D(3D)Series   0: X-axis value, 1: Y-axis value
                Pie2D(3D)Series         0: X-axis value, 1: Y-axis value 2: radius
                Bubble3DSeries         0: value, 1: percentage

// Important: HTML tags can not be used in labelJsFunction.
*/
function seriesLabelFunc(seriesId, index, data, values)
{
        return "$"+values[1];
}
```

<Example 73 Example: JavaScript Function Called for Numeric Data Fields>

Series	labelJsFunction
Column2DSeries Column3DSeries, Bar2DSeries, Bar3DSeries	insideLabelJsFunction, outsideLabelJsFunction
Line2DSeries, Area2DSeries	upLabelJsFunction, downLabelJsFunction
Bubble3DSeries	insideLabelJsFunction
Pie2DSeries, Pie3DSeries,	labelJsFunction

<Table 26 labelJsFunction for Each Series>

The labelJsFunction is related with labelPosition.

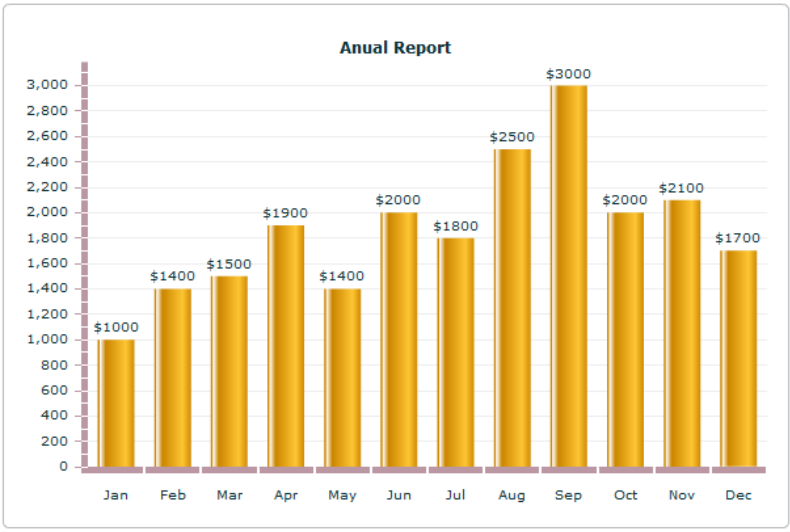
- **HTML tags can not be used for labelJsFunction.**

The following table describes the parameters used in the above example.

Parameters	Descriptions
seriesId	The corresponding series ID.
index	The index of the corresponding item.
data	The original data of the items.
values	The value of the items. This parameter is passed as the array-type data and the elements of the array are determined based on the chart type as follows:

BarSeries(Bar3DSeries)	0: X-axis value, 1: Y-axis value
ColumnSeries(Column3DSeries)	0: X-axis value, 1: Y-axis value
Bubble3DSeries	0: X-axis value, 1: Y-axis value 2: radius
Pie2DSeries(Pie3DSeries)	0: value, 1: percentage

<Table 27 Parameters: Function Called for Numeric Data Fields>



<Figure 45 Output: Function Call for Numeric Data Fields>

7.9.4. Filling Colors

If you want to fill items with user-defined colors based on certain conditions, you need to define fillJsFunction in the series node.

The following is an example layout to define fillJsFunction in a Column 3D chart.

```
<Column3DChart showDataTips="true" gutterLeft="0" showLabelVertically="true">
                <series>
                        <Column3DSeries yField="Profit"
                        fillJsFunction="fillJsFunc"  styleName="seriesStyle">
                                <showDataEffect>
```

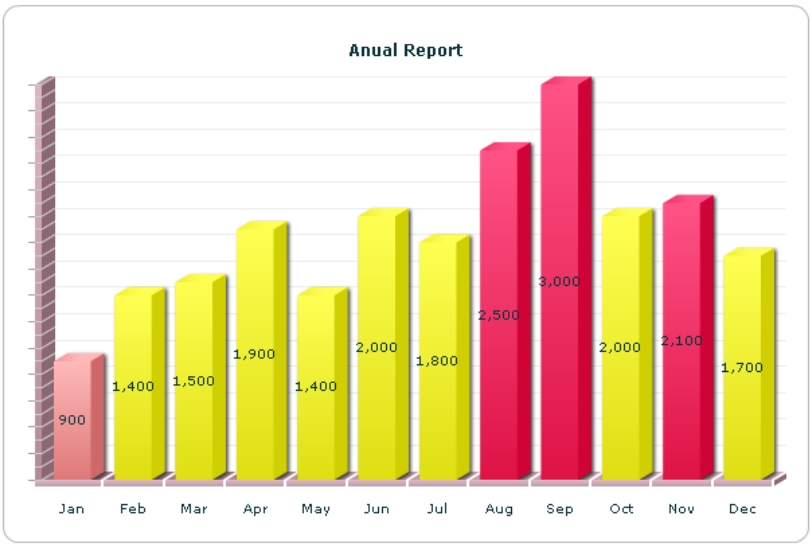
```
                                        <SeriesSlide direction="up" duration="1000"/>
                                    </showDataEffect>
                                </Column3DSeries>
                            </series>
...
...
...
</Column3DChart>
```

<*Example 74 Usage Example: fillJsFunction*>

The following example shows the user-defined function (fillJsFunc) set for fillJsFunction.

```
/*
//-------------------- A user-defined function for fillJsFunction ---------------------------------
//
//Parameters:
//seriesId: The corresponding series ID
//index: The index of the corresponding item
//data: The original data of the items.
//values: The value of the items. This parameter is passed as the array-type data and the elements of the array are
determined based on the chart type as follows:
            Bar2D(3D)Series         0: X-axis value, 1: Y-axis value
            Column2D(3D)Series   0: X-axis value, 1: Y-axis value
            Area2DSeries             0: X-axis value, 1: Y-axis value
            Bubble3DSeries          0: X-axis value, 1: Y-axis value 2: radius
            Line2DSeries             0: X-axis value, 1: Y-axis value
            Pie2D(3D)Series         0: value, 1: percentage, 2: nameField

// If you defined minField in From-To charts, the last index of the values is minField.
*/
function fillJsFunc(seriesId, index, data, values)
{
        if(values[1] > 2000)
                return "0xFF3366";
        else if(values[1] > 1000)
                return "0xFFFF33";
        else
                return "0xFF9999";
}
```

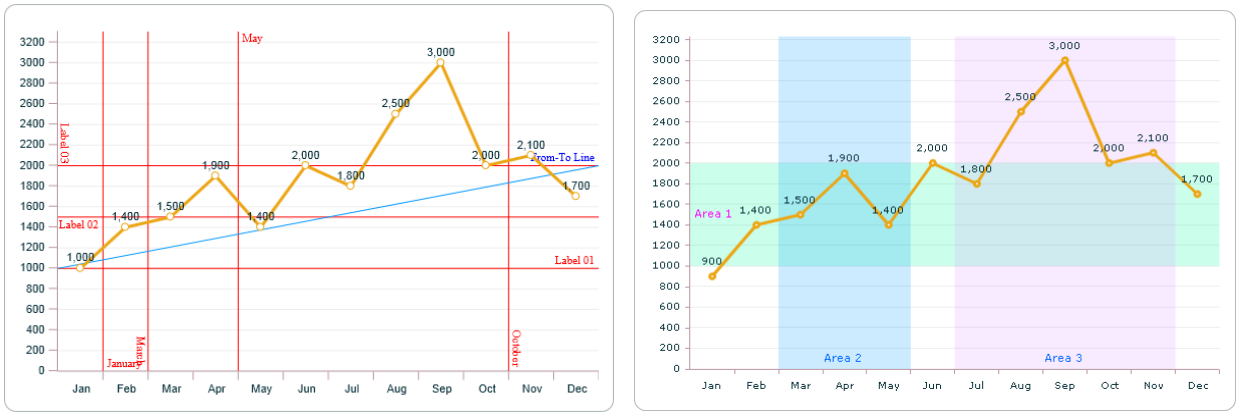
<*Example 75 Example: JavaScript Function Called for fillJsFunction*>



<Figure 46 Output: Function Call for fillJsFunction>

7.10. Creating Areas and Lines

You can create upper and lower limit lines or ranges as the following examples show.



<Figure 47 Outputs: Charts with Lines and Ranges>

Parameters	Descriptions
The properties of backgroundElements or annotationElements	Displays ranges or lines in the background (backgroundElements) or foreground (annotationElements).
AxisMarker	Displays AxisLine and AxisRange.
AxisLine	Lines
AxisRange	Ranges

The following layout shows how to display lines and ranges.

```
<KoolChart backgroundColor="0xFFFFFF">
        <Stroke id="stroke1" color="0xFF0000" weight="1"/>
        <Line2DChart showDataTips="true">


                ......
                  // Displays lines and areas as background elements.
        <backgroundElements>
                <GridLines/> // Draws lines and areas as grids
                <AxisMarker> // Creating AxisMarker to represent lines and areas

                <lines> // Draw lines
                // Draws 3 lines by Creating 3 AxisLines.
                <AxisLine value="1000" label="Label 01" stroke="{stroke1}" labelUpDown="up"
color="0xFF0000"/>

                <AxisLine value="1500" label="Label 02" stroke="{stroke1}" labelAlign="left"
labelUpDown="down" color="0xFF0000"/>

                <AxisLine value="2000" label="Label 03" stroke="{stroke1}" labelUpDown="up" labelAlign="left"
labelRotation="90" color="0xFF0000"/>
                </lines>

                <ranges> // Draws areas.
                // Draws 2 areas by Creating 2 AxisRanges
                <AxisRange startValue="1000" endValue="2000" label="Area 1" fontSize="11"
                labelHorizontalAlign="left" color="0xFF00FF">
                        <fill>
                                <SolidColor color="0x00FF99" alpha="0.2"/>
                        </fill>
                </AxisRange>
```

```
                    <AxisRange startValue="Mar" endValue="May" label="Area 2" fontSize="11"
labelVerticalAlign="bottom" color="0x0066FF" horizontal="false">
                        <fill>
                            <SolidColor color="0x0099FF" alpha="0.2"/>
                        </fill>
                    </AxisRange>
                    </ranges>

                    </AxisMarker>
                    </backgroundElements>
            </Line2DChart>
</KoolChart>
```

<*Example 76 Example: Lines and Ranges*>

The following table shows the properties for lines and ranges.

Properties	Values	Descriptions
lines	AxisLine	Defines lines displayed in charts.
ranges	AxisRange	Defines ranges displayed in charts.

<*Table 28 Nodes to Display Lines or Ranges*>

All the properties of Caption can be used in AxisRange and AxisLine. The following table shows the properties of AxisRange and AxisLine. (The properties of Caption are not shown in the following table. Please refer to <5.3.1 Creating Captions and Subcaptions> for the properties of Caption.)

AxisLine -

Properties	Values	Descriptions
labelAlign	center,left,right (default: right)	Specifies the horizontal alignment of the label. If the value of the *horizontal* property is false, left is the same as top and right is the same as bottom.
labelUpDown	up,down (default: up)	Specifies the position from the line where the label is placed. If the value of the *horizontal* property is false, up is the same as right and down is the same as left.
labelRotation	0~360 (default: 0)	Rotates labels. If embeded fonts are used then any value of 0~360 can be available but if system fonts are used then only 0 is available.
linePosition	center, left, right	Specifies the positions where the lines are displayed

		for CategoryAxis. In CategoryAxis, multiple positions are allowed for one value.
stroke	Stroke	Defines the style of lines.
startValue	Number,String	If you want to draw the diagonal line, specify the position where the line starts. The *startValue* property is ignored when the *value* property is set.
endValue	Number,String	If you want to draw the diagonal line, specifies the position where the line ends. The *endValue* property is ignored when the *value* property is set.
Value	Number,String	If you want to draw the normal line (not diagonal line), specify the position of the line.
label	String	Specifies the text displayed in lines.

<Table 29 Properties: AxisLine>

AxisRange -

Properties	Values	Descriptions
labelHorizontalAlign	String (center,left,right)	Specifies the horizontal alignment of the label.
labelVerticalAlign	String (top,middle,bottom)	Specifies the vertical alignment of the label.
labelRotation	Number	Rotates labels. Any value of 0~360 can be available for embedded fonts but only 0 or 90 are available for system fonts.
fill	Uint	Specifies colors to fill areas.
startValue	Number, String	Specifies the position where the area starts.
endValue	Number, String	Specifies the position where the area ends.
horizontal	Boolean (true, false)	Whether or not to draw horizontal ranges. true: Draws ranges with Y-axis values. (The Y-axis value is used) false: Draws ranges with X-axis values. (The X-axis value is used)
label	String	Specifies the text displayed in lines.

<Table 30 Properties: AxisRange>

7.11. Zooming and Showing Crosshairs

The zoom and the crosshairs enable you to enlarge certain areas of the chart and to locate a particular point on the chart, respectively.

The zoom and the crosshairs can be used for all charts except the following charts:

- Radar Chart
- Pie Chart, Doughnut Chart
- History Chart, Scroll Chart
- Gauge Chart

You can use the zoom and the crosshairs using the CrossRangeZoomer node.

The following example shows how to define CrossRangeZoomer. The CrossRangeZoomer node should be defined as a child of the annotationElements node.

```
<KoolChart>
<Combination2DChart showDataTips="true">
  <series>
    <Line2DSeries yField="Profit" displayName="Profit"/>
  </series>
  <annotationElements>
    <CrossRangeZoomer zoomType="horizontal" fontSize="11" color="0x00000"
      verticalLabelPlacement="bottom" enableZooming="true" enableCrossHair="true">
      <zoomRangeStroke>
        <Stroke weight="1" color="0xFF0000" alpha="0.3"/>
      </zoomRangeStroke>
      <zoomRangeFill>
        <SolidColor color="0x0000FF" alpha="0.2"/>
      </zoomRangeFill>
    </CrossRangeZoomer>
  </annotationElements>
</Combination2DChart>
</KoolChart>
```

<Example 77 Example: Zoom and Crosshairs>

Properties	Values	Descriptions
horizontalStroke	Stroke	Specifies the horizontal line of crosshairs.
verticalStroke	Stroke	Specifies the vertical line of crosshairs.
zoomRangeStroke	Stroke	Specifies the line style for zoom areas.
zoomRangeFill	SolidColor	Specifies the fill color for zoom areas.
horizontalLabelFormatter	Formatter id	Specifies the formatter for the label of the horizontal line of crosshairs.
horizontalLabelOppFormatter	Formatter id	Specifies the formatter for the right side label of the horizontal line of crosshairs. (It is valid only if useDualCrossXLabel = true)
horizontalLabelPlacement	left| right (default: left)	Specifies the position for the label of the horizontal line of crosshairs. left: Displays the X, Y coordinates on the left side of the chart. right: Displays the X, Y coordinates on the right side of the chart.
showValueLabels	true| false (default: true)	Whether or not to display the X, Y coordinates. (The current position of the mouse point.)

verticalLabelFormatter	Formatter id	Specifies the formatter for the label of the vertical line of crosshairs.
verticalLabelOppFormatter	Formatter id	Specifies the formatter for the top side label of the vertical line of crosshairs. (It is valid only if useDualCrossXLabel = true)
verticalLabelPlacement	top|bottom (default: bottom)	Specifies the position for the label of the vertical line of crosshairs. top: Displays the X, Y coordinates on the top side of the chart. bottom: Displays the X, Y coordinates on the bottom side of the chart.
useDualCrossXLabel	false|true (default: false)	Whether or not to display two axes labels if more than two vertical axes are defined. (If useDualCrossXLabel="true" horozontalLabelPlacement will be ignored) For example, if three vertical axes are defined, the labels of the first two axes will be displayed
useDualCrossYLabel	false|true (default: false)	Whether or not to display two axes labels if more than two horizontal axes are defined. (If useDualCrossYLabel="true" verticalLabelPlacement will be ignored) For example, if three horizontal axes are defined, the labels of the first two axes will be displayed.
enableCrossHair		Whether or not to use the crosshairs.
enableZooming		Whether or not to use the zoom.
zoomType	horizontal, vertical, both (default: both)	Specifies the axes for zoom if enableZooming = "true". For example, if zoomType="horizontal", only the horizontal axis will be zoomed in.
resetMode	initial, auto(default: auto)	Specifies the restore method if enableZooming = "true". initial: uses the minimum and maximum value defined by users. auto: the minimum and maximum values are determined by the system automatically.

<Table 31 Properties: Zoom and Crosshairs >

7.12. Adding Memos

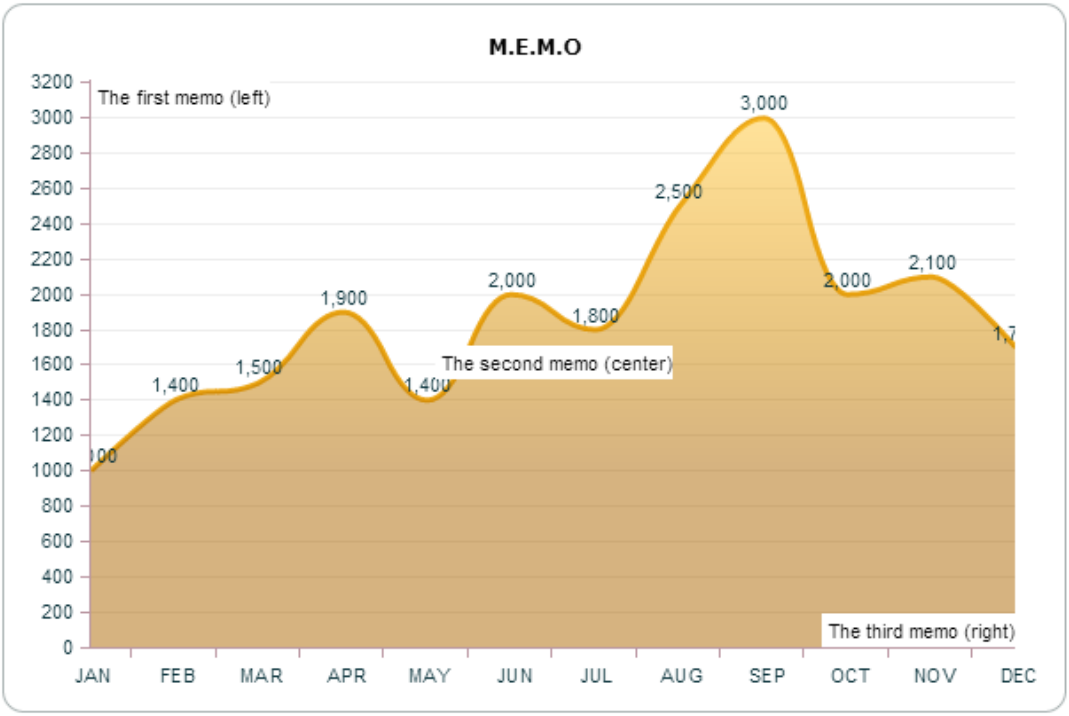
You might want to add the text annotation to the chart. Annotations are positioned based on the point of X and Y coordinates of the chart rather than the items to which you want to add an annotation. You can display annotations either on the top of the chart using annotationElements or in the background of the chart using backgroudElements.

The following example shows how to write memos at the top of the chart.

```
<KoolChart>
  <Line2DChart showDataTips="true">
    <series>
    .....
    </series>
    <annotationElements>

      <CanvasElement>
        <!-- label 1 -->
        <Label left="0" text="The first memo (left)" fontSize="11"  borderColor="0x000000" >
        </Label>
        <!-- label 2 -->
        <Label right="0" text="The third memo (right)" fontSize="11" borderColor="0x000000">
        </Label>
        <!-- label 3 -->
        <Label horizontalCenter="0" verticalCenter="0" text=" The second memo (center)" fontSize="11"
        borderColor="0x000000">
        </Label>
      </CanvasElement>
    </annotationElements>
  </Line2DChart>
</KoolChart>
```

<Example 78 Example: Memo>

The following is the output produced by the layout above.



<Figure 48 Output: Chart with Memo>

- For further information of the properties of labels, please refer to <5.3.1 Creating Captions and Subcaptions>.

The following table shows the unique properties of labels.

Properties	Values	Descriptions
backgroundColor	RGB	Specifies the background color.
backgroundAlpha	0~1	Specifies the transparency of the background.
borderColor	RGB	Specifies the border color.
borderAlpha	0~1	Specifies the transparency of the border.
borderThickness	Number (pixel)	Specifies the thickness of the border.
cornerRadius	Number	Specifies the roundness of the corner.
borderStyle	solid, none	Whether or not to display border lines.

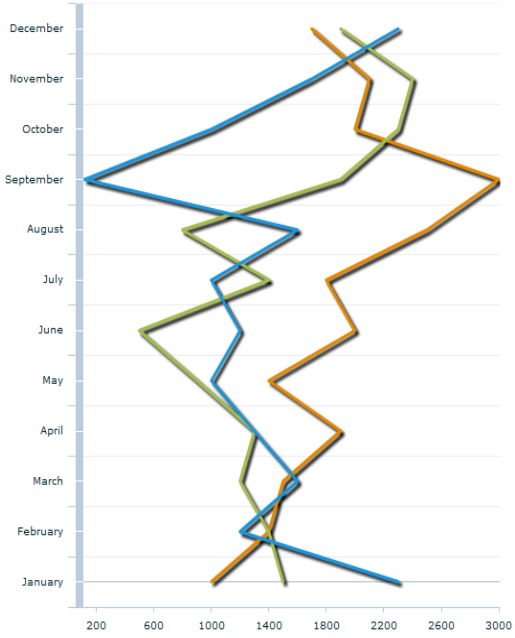
<Table 32 Properties: Labels>

7.13. Using Vertical Lines in Line Charts

Line charts display lines along the horizontal axis but if you want to make lines display vertically rather than horizontally, you must do the followings:

- Create CategoryAxis as a child node of verticalAxis.
- Set the number field (value) to xField and the name field to yField.
- Set the value of sortOnXField to false.

```
<rMateChart>
  <Line2DChart>
    <verticalAxis>
        <CategoryAxis categoryField="Month"/>
    </verticalAxis>
    <series>
        <Line2DSeries xField="Profits" yField="Month"
sortOnXField="false" displayName="Profits">
        </Line2DSeries>
        <Line2DSeries xField="Costs" yField="Month"
sortOnXField="false" displayName="Costs">
        </Line2DSeries>
         <Line2DSeries xField="Revenue"
yField="Month" sortOnXField="false"
displayName="Revenue">
         </Line2DSeries>
        </series>
  </Line2DChart>
</rMateChart>
```



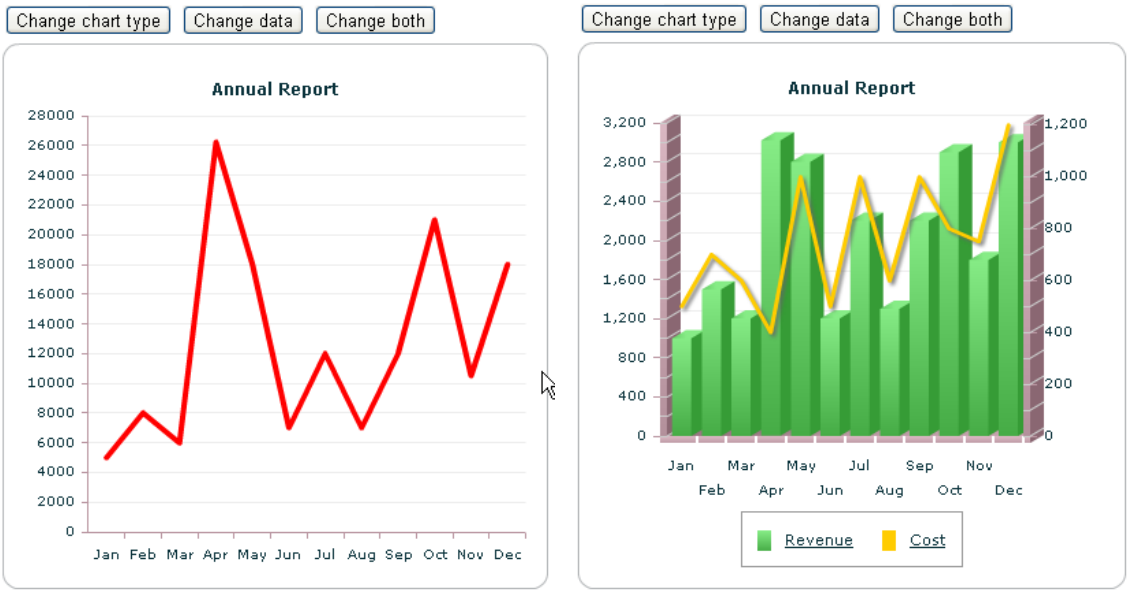
< Example 79 Example: Layout and Output of Showing Data along Y-Axis>

7.14. Changing Layouts and Data Dynamically

You may want to change data in charts dynamically or convert the type of the chart to the different type. KoolChart supports changing layouts or data dynamically without refreshing the web page.

The following example shows a line chart with data series1, which can be converted to the column chart with the same data serise by clicking the button on the top of the line chart and vice versa. The line chart with data series 1 can also be dynamically changed to another line chart with data series 2 by

cliking the *change data* button as shown in the following example.



< Figure 49 Output: Dynamic Changes>

The following HTML is used to generate the above output.

```
<html lang="en">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<script src="KoolChart.js" language="javascript"></script>
<script language="JavaScript" type="text/javascript">

var chartVars = "&KoolOnLoadCallFunction=KoolChartOnLoad";

KoolChart.create("chart1", "chartHolder", chartVars, "100%", "100%");

function KoolChartOnLoad()
{
        chart.setLayout(layoutStr);
        chart.setData(chartData);
}

var layoutURL = encodeURIComponent("chartLayout.xml");
var layoutStr = "<KoolChart cornerRadius='12' borderStyle='solid'>"
        +"<Options><Caption text='Annual Report'/></Options>"
        +"<Line2DChart showDataTips='true'>"
        +"<horizontalAxis><CategoryAxis categoryField='Month'/></horizontalAxis>"
        +"<series><Line2DSeries yField='Profit' displayName='Profit'>"
```

```
            +"<showDataEffect><SeriesInterpolate/></showDataEffect>"
            +"<lineStroke><Stroke color='0xFF0000'weight='4'/>"
           +"</lineStroke></Line2DSeries>"
            +"</series></Line2DChart></KoolChart>";

var chartData = [{"Month":"Jan", "Revenue":10000, "Cost":5000, "Profit":5000},
            {"Month":"Feb", "Revenue":15000, "Cost":7000, "Profit":8000},
            {"Month":"Mar", "Revenue":12000 , "Cost":6000, "Profit":6000},
            {"Month":"Apr", "Revenue":30200, "Cost":4000, "Profit":26200},
            {"Month":"May", "Revenue":28000, "Cost":10000, "Profit":18000},
            {"Month":"Jun", "Revenue":12000, "Cost":5000, "Profit":7000},
            {"Month":"Jul", "Revenue":22000, "Cost":10000, "Profit":12000},
            {"Month":"Aug", "Revenue":13000, "Cost":6000, "Profit":7000},
            {"Month":"Sep", "Revenue":22000, "Cost":10000, "Profit":12000},
            {"Month":"Oct", "Revenue":29000, "Cost":8000, "Profit":21000},
            {"Month":"Nov", "Revenue":18000, "Cost":7500, "Profit":10500},
            {"Month":"Dec", "Revenue":30000, "Cost":12000, "Profit":18000} ];

var chartData2 = [{"Month":"Jan", "Revenue":1000, "Cost":500, "Profit":500},
            {"Month":"Feb", "Revenue":1500, "Cost":700, "Profit":800},
            {"Month":"Mar", "Revenue":1200 , "Cost":600, "Profit":600},
            {"Month":"Apr", "Revenue":3020, "Cost":400, "Profit":2620},
            {"Month":"May", "Revenue":2800, "Cost":1000, "Profit":1800},
            {"Month":"Jun", "Revenue":1200, "Cost":500, "Profit":700},
            {"Month":"Jul", "Revenue":2200, "Cost":1000, "Profit":1200},
            {"Month":"Aug", "Revenue":1300, "Cost":600, "Profit":700},
            {"Month":"Sep", "Revenue":2200, "Cost":1000, "Profit":1200},
            {"Month":"Oct", "Revenue":2900, "Cost":800, "Profit":2100},
            {"Month":"Nov", "Revenue":1800, "Cost":750, "Profit":1050},
            {"Month":"Dec", "Revenue":3000, "Cost":1200, "Profit":1800} ];

// Change chart type
function changeLayout()
{
    chart.setLayoutURL(layoutURL);
}

// Change data
function changeData()
{
    chart.setData(chartData2);
}

// Change both
```

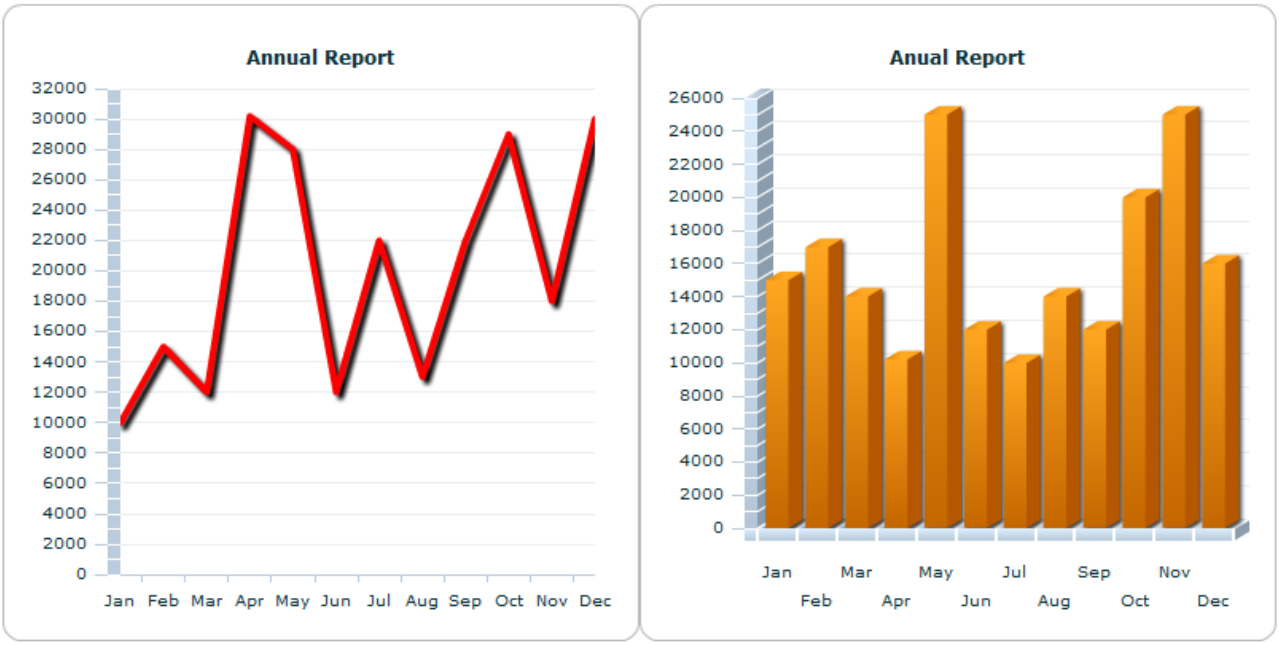
```
function changeBoth()
{
	chart.setLayout(layoutStr);
	chart.setData(chartData);
}

</script>
</head>

<body>
<table>
		<tr>
			<td>
		<input type="button" value="Change chart type" onclick="changeLayout()"/>
		<input type="button" value="Change data " onclick="changeData()"/>
		<input type="button" value="Change Both" onclick="changeBoth()"/>
			</td>
		</tr>
		<tr>
		<td>
			<div class="content">
				<div id="chartHolder" style="width:600px; height:400px;">
				</div>
			</div>
		</td>
</tr>
</table>

</body>
</html>
```

<Example 80 Example: Dynamic Changes>

7.15. Creating Multiple Charts in an HTML

You can create multiple charts in a web page.

The following example shows the two charts created in a single HTML file.



<Figure 50 Outputs: Two Charts in a Single HTML File>

The following example shows how to create two charts in a single HTML file.

```
<html lang="en">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<script src="KoolChart.js" language="javascript"></script>
<script language="JavaScript" type="text/javascript">

// ----------------------Sets chartVars for the first chart ----------------------
var chartVars = "&KoolOnLoadCallFunction=KoolChartOnLoad";

// ----------------------Sets chartVars for the second chart ----------------------
var chartVars2 = "&KoolOnLoadCallFunction=KoolChartOnLoad2";

// creates KoolChart.
KoolChart.create("chart1", "chartHolder", chartVars, "100%", "100%");
KoolChart.create("chart2", "chartHolder2", chartVars2, "100%", "100%");

function KoolChartOnLoad()
{
        chart1.setLayout(layoutStr);
        chart1.setData(chartData);
}

// This function is called when the second chart is created. (user-defined function)
```

```
function KoolChartOnLoad2()
{
	chart2.setLayoutURL(layoutURL2);
	chart2.setData(chartData2);
}

// Layouts used dynamically.
var layoutURL2 = encodeURIComponent("chartLayout.xml");
var layoutStr = "<KoolChart cornerRadius='12' borderStyle='solid'>"
	+"<Options><Caption text='Annual Report'/></Options>"
	+"<Line2DChart showDataTips='true'>"
	+"<horizontalAxis><CategoryAxis categoryField='Month'/></horizontalAxis>"
	+"<series><Line2DSeries yField='Profit' displayName='Profit'>"
	+"<showDataEffect><SeriesInterpolate/></showDataEffect>"
	+"<lineStroke><Stroke color='0xFF0000'weight='4'/>"
	+"</lineStroke></Line2DSeries>"
	+"</series></Line2DChart></KoolChart>";

// Data used dynamically.
var chartData = [{"Month":"Jan", "Revenue":10000, "Cost":5000, "Profit":5000},
	{"Month":"Feb", "Revenue":15000, "Cost":7000, "Profit":8000},
	{"Month":"Mar", "Revenue":12000 , "Cost":6000, "Profit":6000},
	{"Month":"Apr", "Revenue":30200, "Cost":4000, "Profit":26200},
	{"Month":"May", "Revenue":28000, "Cost":10000, "Profit":18000},
	{"Month":"Jun", "Revenue":12000, "Cost":5000, "Profit":7000},
	{"Month":"Jul", "Revenue":22000, "Cost":10000, "Profit":12000},
	{"Month":"Aug", "Revenue":13000, "Cost":6000, "Profit":7000},
	{"Month":"Sep", "Revenue":22000, "Cost":10000, "Profit":12000},
	{"Month":"Oct", "Revenue":29000, "Cost":8000, "Profit":21000},
	{"Month":"Nov", "Revenue":18000, "Cost":7500, "Profit":10500},
	{"Month":"Dec", "Revenue":30000, "Cost":12000, "Profit":18000} ];

var chartData2 = [{"Month":"Jan", "Revenue":1000, "Cost":500, "Profit":500},
	{"Month":"Feb", "Revenue":1500, "Cost":700, "Profit":800},
	{"Month":"Mar", "Revenue":1200 , "Cost":600, "Profit":600},
	{"Month":"Apr", "Revenue":3020, "Cost":400, "Profit":2620},
	{"Month":"May", "Revenue":2800, "Cost":1000, "Profit":1800},
	{"Month":"Jun", "Revenue":1200, "Cost":500, "Profit":700},
	{"Month":"Jul", "Revenue":2200, "Cost":1000, "Profit":1200},
	{"Month":"Aug", "Revenue":1300, "Cost":600, "Profit":700},
	{"Month":"Sep", "Revenue":2200, "Cost":1000, "Profit":1200},
	{"Month":"Oct", "Revenue":2900, "Cost":800, "Profit":2100},
	{"Month":"Nov", "Revenue":1800, "Cost":750, "Profit":1050},
	{"Month":"Dec", "Revenue":3000, "Cost":1200, "Profit":1800} ];
```

```
</script>
</head>

<body>
<table align="center" border="0" cellpadding="0" cellspacing="0">
        <tr>
        <td align="center">
                <div class="content">
                        <div id="chartHolder" style="width:600px; height:400px;">
                        </div>
                </div>
        </td>
        <td align="center">
                <div class="content">
                        <div id="chartHolder2" style="width:600px; height:400px;">
                        </div>
                </div>
        </td>

</tr>
</table>
</body>
</html>
```

<Example 81 Example: Two Charts in a Single HTML File>

7.16. Real-Time Chart Example – A Stock Monitoring Chart

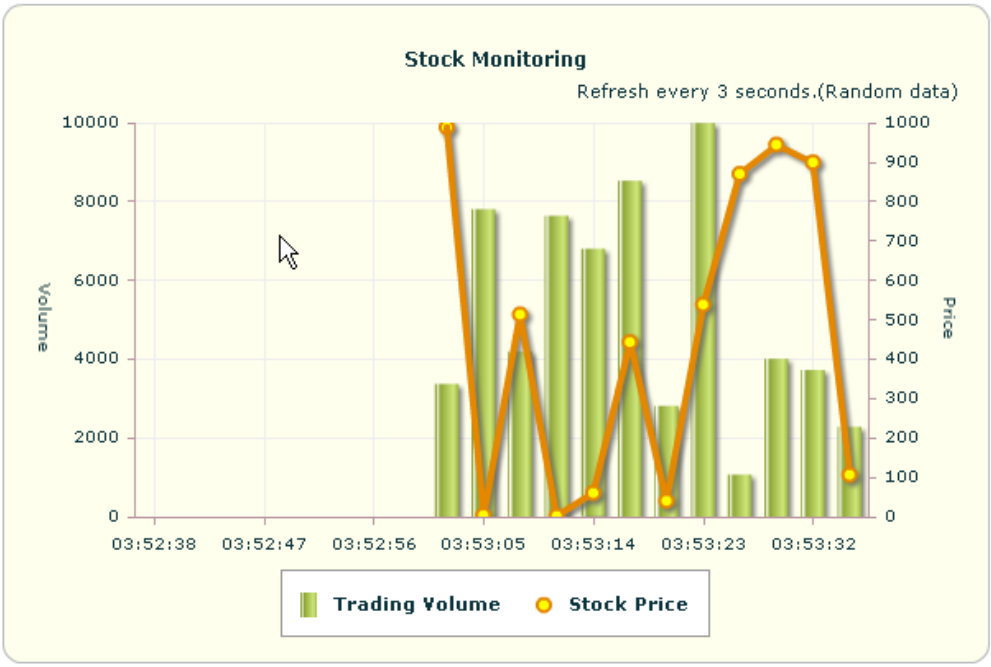
The Real-time chart is widely used for monitoring the variation of stock prices. The following example shows how to create a Real-time chart to monitor stock prices.

```
<KoolChart backgroundColor="0xFFFFEE" cornerRadius="12" borderStyle="solid">
        <Options>
                <Caption text="Stock Monitoring" />
                <SubCaption text=" Refresh every 3 seconds.(Random data)" fontSize="11" textAlign="right"/>
                <Legend/>
        </Options>
        <DateFormatter id="dateFmt" formatString="HH:NN:SS" /> //Defines formatter

       // Type : time, Refresh : every 3 seconds, Duration : 60 seconds
        <RealTimeChart id="chart" dataDisplayType="time"   timePeriod="60" interval="3" showDataTips="true">
```

```
                    <backgroundElements>
                            <GridLines direction="both"/>
                    </backgroundElements>

                // DateTime is used for the horizontal axis
                // The measure of data is second
                // Data refresh interval is 3 seconds
                // The interval of axis label is 9 deconds
                // The local time is used (not GMT)
                    <horizontalAxis>
                              <DateTimeAxis id="hAxis" dataUnits="seconds" labelUnits="seconds" dataInterval="3"
interval="9" formatter="{dateFmt}" displayLocalTime="true"/>
                    </horizontalAxis>
                    <series>
                            <Column2DSeries yField="Volume" xField="Time"
                                    displayName="Trading Volume"
                            itemRenderer="net.riamore.rmate.charts.renderers.GradientColumnItemRenderer">
                                 <fill>
                                        <SolidColor color="0xB0C759"/>
                                 </fill>
                                <verticalAxis>
                                   <LinearAxis id="vAxis1"   title="Volume" minimum="0"
maximum="10000"/>
                                </verticalAxis>
                            </Column2DSeries>

                            <Line2DSeries xField="Time" yField="Price" displayName="Stock Price"
                            itemRenderer="mx.charts.renderers.CircleItemRenderer"   radius="5" fill="0xFFFF00">
                                 <stroke>
                                        <Stroke color="0xE48701" weight="2"/>
                                </stroke>
                                <lineStroke>
                                        <Stroke color="0xE48701" weight="4"/>
                                </lineStroke>
                                <verticalAxis>
                                        <LinearAxis id="vAxis2" title="Price" minimum="0"
maximum="1000"/>
                                </verticalAxis>
                            </Line2DSeries>
                    </series>
                    <verticalAxisRenderers>
                            <Axis2DRenderer placement="left" axis="{vAxis1}">
                            </Axis2DRenderer>
                            <Axis2DRenderer placement="right" axis="{vAxis2}">
```

```
                        </Axis2DRenderer>
                    </verticalAxisRenderers>
                </RealTimeChart>
                // Defines RPC to refresh data.
                <HttpServiceRepeater url="http://demo.riamore.net/chartTest/data4.jsp" target="{chart}" interval="3"
method="get"/>
</KoolChart>
```

<Example 82 Example: Monitor Stocks>



<Figure 51 Output: Real-time Chart to Monitor Stocks>

7.17. Exporting Charts as Image

You can export charts as an image file encoded in Base64 format. KoolChart 2.0 supports this functionality by using the toDataURL() method of HTML5 Canvas. As the toDataURL() method is not supported in excanvas.js, you cannot use IE 7, 8 for exporting charts. The following example shows how to call KoolChart-provided method, saveAsImage(), for exporting the chart as the Base64-formatted data.

```
function snapShot(){
        var base64src = document.getElementById("chart1").saveAsImage();
        document.getElementById("img").src = base64src;
}
```

The saveAsImage() method is a KoolChart-provided function called by accessing (calling getElementById()) the chart

id ("chart1" in the example above). When the first statement is executed, the image data encoded in Base64 format is saved to the variable, base64src. As JavaScript cannot save a file to the local PC, we provide an example that opens a new popup window that displays the chart image. You can save the image file to the local PC by clicking the right mouse button. Please refer to the example (Chart Samples → Export Chart → Save as Image).

7.18. Sending Chart Image to Server

You can send the chart image to the server to save it to your server or to create a new image file with the chart image. The following example is a JavaScript function for sending the chart image to the server.

```
// JavaScript function: generating the Base64 formatted data and submitting it to the server.
function getSanpshot(){
        // generating the Base64 formatted data.
        var base64src = document.getElementById("chart1").getSnapshot();
        var data = document.getElementById("data");
        var extension = document.getElementById("extension");
        // extension (image file)
        extension.value = "png";
        // image source
        data.value = base64src
        // when the image is submitted, the server-side script needs to decode the image and save it to the server.
        document.getElementById("sumForm").submit();
}
```

In the above JavaScript function, the getSnapshot() method is called to generate the Base64 formatted data, which is sent to the server. As the getSnapshot() method also uses the toDataURL() method of HTML5 Canvas, this functionality cannot be used in IE 7, 8. In order to use the above function, the HTML Form script and the server-side script need to be written. Please refer to the example (Chart Samples → Export Chart → Save as Image).

7.19. Exporting Charts in Mobile

Exporting the chart image is supported in any HTML5 supported browser so that you can use this functionality in your mobile devices. Until the time of KoolChart 2.0 release, exporting the chart image is not supported in Android 2.3 (Gingerbread) and below. It generally works well in Android 4.0 (Ice Cream Sandwitch) and above. Please refer to the example, http://m.koolchart.com/Samples/GetSnapshot.html

〈Thank You〉